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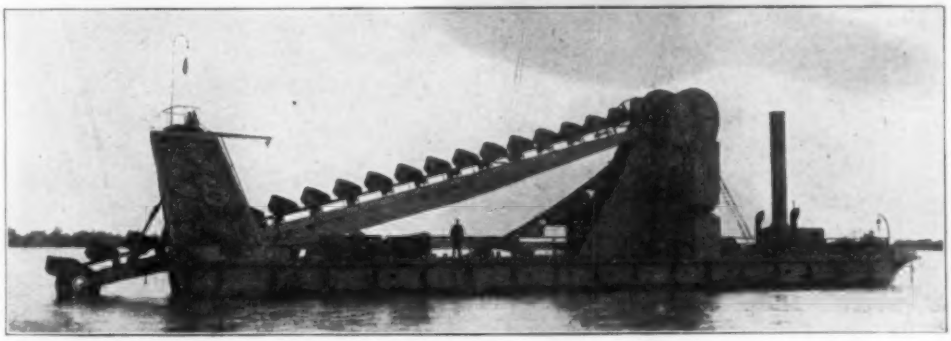
Powerful English Dredger Lifts Over a Thousand Tons an Hour

An English railway company now has in operation a huge dredger, the "Marquess," which has a maximum capacity of 1,030 tons of dredged and discharged material per hour. The entire hull of this powerful machine is of mild steel. Its deck is 136 feet, 3 inches long; 24 feet, 7½ inches wide and 10 feet deep. The bucket ladder is 88½ feet long and each bucket has a capacity of 19 cubic feet. The buckets pass over the upper tumbler which is 28 feet above the load water line, at the rate of 16 a minute. By means of a valve they empty into either of the discharge chutes which are located on either side. The transmission of power is by two camel's hair belts, and if the buckets meet with an obstruction the belt slips and prevents the chain breaking. The engine is of the compound type, fitted with a surface condenser and a reverse.

The boiler is of the type used on sea vessels. The dredger is provided with five steam and two hand windlasses and all its operations are controlled from the deck. It is lighted by electricity throughout and has cabins for the captain, mate, engineer, firemaa and crew. It operates to a depth of 45 feet below the surface of the water. The contract on which it was constructed called for a capacity of 650 tons per hour for work in compact clay, gravel and sand and 325 tons per hour for work in marl. It far exceeds this as its average is 853 tons per hour.



The "Marquess," a Huge English Dredger, Excavates 1,030 Tons of Material Per Hour

SANTA SUSANA TUNNEL FINISHED.

Third Largest Tunnel West of the Rocky Mountains

The great Santa Susana tunnel is finished. For over three years hundreds of men have toiled ceaselessly by night and day boring the long hole through the Santa Susana mountains. The tunnel which is 8,000 feet long saves six miles of mountain climbing for the main transcontinental line of the Southern Pacific railway. It cost over

"For Three Years Men Toiled Ceaselessly."

$1,000,000 and is the third largest tunnel west of the Rocky mountains.

The tunnel is about 35 miles northwest of Los Angeles, and was begun in 1900. The work was prosecuted from both sides of the mountain, and at each opening was established camps to accommodate the workmen. Electric light and air compressing plants were installed in each camp. The drilling and hauling away of the debris was done by machinery driven by compressed air. The escape of air from the drills furnished fresh air for the men engaged in the work. So complete were all the arrangements that few accidents occurred during the entire work.

When the two working forces met there was less than a foot difference in their lines. Trains are now running through the big bore and the workmen and their machines have gone elsewhere, and the two villages which were their homes for three years are deserted.

DON'T LOSE YOUR HEAD.

One of the most important and valuable traits is the ability to retain your presence of mind at all times. We say all times, because there is little occasion to use any effort to keep cool when affairs are as they usually are or should be, but in emergencies, the times when the man with self-possession is not carried off his feet in the mad rush of the panic. And it is a quality which anyone can attain if he only will. The young man, especially, should train himself to this at every opportunity. When once he begins to realize this power, this self control, he will progress rapidly.

What training will do is easily illustrated in the case of the horses in fire departments, which stand alone in their place with a shower of sparks falling all about them, or the cavalry horse, who never flinches while his rider rests a rifle on his head and fires. If horses can be so trained, certainly our young men should not be less qualified. It is quite as essential as a knowledge of swimming.

Take for instance the Slocum disaster. It now appears that had one man kept his head, it would not have occurred. The fire started in a barrel of rubbish, and one of the deck hands tried to smother the flames by throwing a sack of charcoal over the barrel. Then he rushed to another part of the boat in search of a hose; before he returned the fire was beyond control. What he could and should have done, as shown at the coroner's investigation, was to throw the barrel overboard and the danger would have been removed. Systematic and regular fire-drill would have aided the man's wits when the emergency came, but this he had not had.

It is a desirable quality to be brave, but mere courage will never accomplish the results which belong to the man who does not lose his head.

Trolley Line to Run Through the Capitol Building at Washington

Congressmen and Senators Will All Ride Free

An electric trolley line will be built through the great Capitol building at Washington. It will not pass up the big front steps, nor through the Senate chamber, but will go whizzing through the basement far below, and Senators and Congressmen can ride free to the heart's content. Anything free is understood to appeal with great force to the average politician, and there was no trouble in securing the necessary right of way through the building and under some of the principal streets. The main depot will be under the Capitol building and several swift elevators will convey the passengers from the different floors of the building down to the central station.

Capitol Building Where Main Depot will be Located, and Street Under Which the "Congressional Limited" will Run

The line is to be a standard electric street car system running in subways to the splendid new office buildings, one of which will be erected for the exclusive use of Representatives and another for the Senators. Already the street car line is spoken of as the "Congressional Limited." The track will be laid in a handsome subway many feet below the street. The walls will be of soft tinted, light colored glazed brick and the arrangements for lighting, heating and ventilation will be perfect. The congressional throat and lungs are not to be subjected to any danger from cold and pneumonia.

The passenger cars will be open, resembling those on scenic railways, but much more comfortable and luxuriously appointed. There will also be broad, smooth cement walks extending along the track for those who prefer to walk. The distance from the Capitol to either of the office buildings is not great, and the cars will make the trip in from two to three minutes.

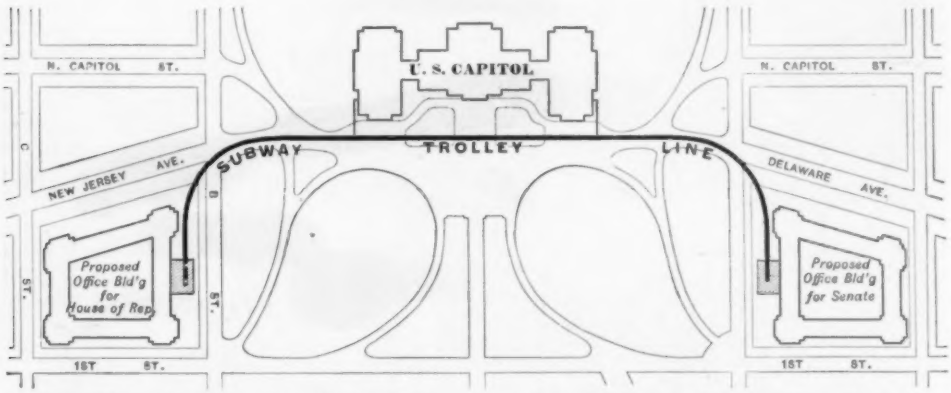
When the Congressman, in his office, hears the Capitol roll-call buzzers, an electric elevator will take him down to his "train" in the basement; a quick dash

through the tunnel, and then another elevator takes him up to the Senate or House Hall, as the case may require.

A freight service will also be installed to run on the underground system, for the purpose of carrying Congressional speeches and other heavy and voluminous printed matter and supplies.

An enormous electric power plant is also a part of the subway line construction. This plant, which will be one of the most perfect ever built, will cost $700,000 and will be located south of the new office building for Representatives. It will furnish power to the railway and all the electric elevators in the office and Capitol buildings, as well as light for them all, and will also run hundreds of electric fans and ventilators. Wires will also be carried underground to the Congressional Library building. The present electric plant is of considerable size, having an output of 2,200 horsepower, with a lighting capacity of 25,000 16-candlepower incandescent lamps, and is located in the basement of the Capitol. Few visitors ever reach these "lower regions" and few even of the guides have ever visited the place. The other machinery includes the boilers and eight steam pumps for fire service.

The Capitol is a magnificent structure, ideally beautiful; sufficient in itself to inspire to good works. Costly machinery furnishes pure, cool air in warm weather, and hot air in winter. Just why machinery is necessary for this latter feature, the average citizen will scarcely comprehend. Bath rooms, barber shops, restaurants galore, are at hand to strengthen and refresh the lawmaker for the work which is chiefly done by the clerk provided each by a generous government. Not satisfied with all this and $14 a day, the magnificent office buildings will be added at a cost of some millions.



Map Showing Route of the "Congressional Limited" Trolley System

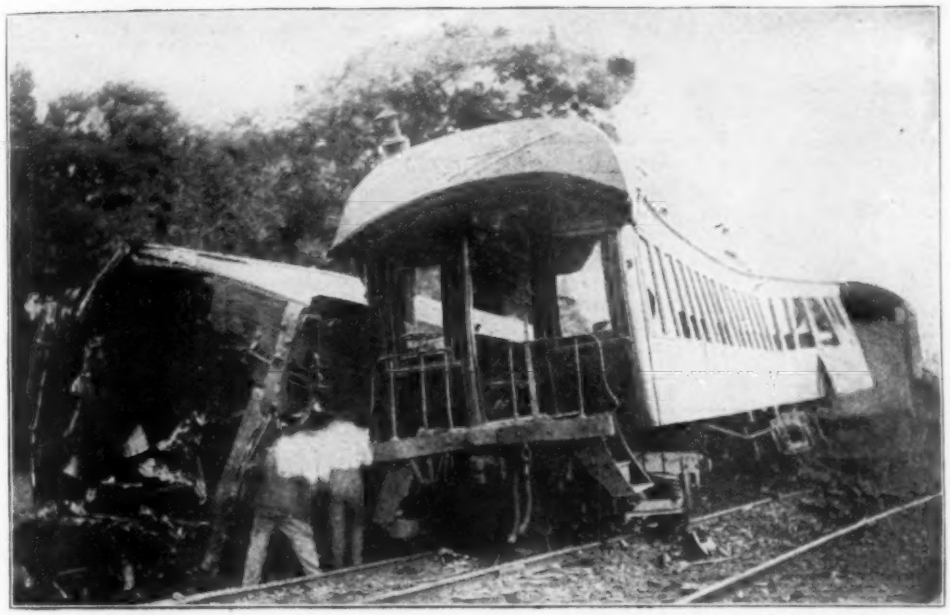
DANGER IN ELECTRIC LAMP DECORATIONS.

It is dangerous to cover incandescent lamp bulbs with drapery and, notably so, to wrap them in cotton, declares Engineering of London. The danger is said to be the greatest in the case of colored lamps. With 16-candlepower colored lamps, cotton in contact with the lamp begins to smoke after ten minutes and sometimes even after three minutes. Only a slight draft of air is required to make the cotton burst into flames, when the bulb collapses on account of its walls softening from the heat. Low candlepower lamps seem to be as bad in this regard as larger lamps. Great care should be taken not to allow inflammable draperies, and particularly those of a fuzzy or fibrous character, to come into contact with the bulbs of decorative lamps.

BIG APPLE CROP THIS YEAR.

A big apple crop is assured this year; not since 1896 have there been so many apples on the trees. Picking and packing time will mean busy days for the orchardists, but before that the box and barrel makers must do their work. Hundreds of thousands of barrels must be made especially for the apple trade.

Passenger Train After Collision



Courtesy Chicago Daily Journal.

The Overturned Coach Where the Victims Met Their Deaths

The above illustration shows part of the wreck of the Sunday School excursion train on the C. & E. I. railroad recently. Twenty-two persons were killed in the overturned car. The passenger train collided with a coal train which occupied the wrong track.

THE AUTO SAVED THE BANK.

As a pleasant change from the many accidents which of late have been credited to the auto comes the story of how one of these machines saved a bank. It was the Lancaster Bank, at Lancaster, O., and the excited depositors were in a panic, each one fighting and pushing to draw out his savings before it was too late. The bank apparently was all right, but the officers had failed to make the people believe it, and a furious run was being made, and rapidly the supply of currency and coin was melting away. Bonds or securities would not go with the angry crowd; nothing would satisfy them but the coin.

The president hastened to Columbus for cash, but reached the depot just too late to catch his train. There was no other train for hours. The money would do no good unless it were behind the railing in the little bank 40 miles away. It was a time for quick action. The president secured an automobile and loading his $35,000 into it ordered the operator to do his best. The roads were none too good, there were hills to climb, and the trip seemed ages to the anxious banker, but in one hour and 28 minutes the machine with its dust-covered passenger dashed into the little town with horn blowing and the banker standing on a seat waving his hat.

The crowd at the bank paused in its scramble, then parted to form a passageway for the clerks who ran out to bring in the heavy bags of coin. Load after load they lugged into the bank while the delighted cashier slashed the bags and piled up the money in great heaps, gold on one side, silver on the other, and stacks of bills built up cob fashion.

When the people saw the display, with the cashier calling to hurry up and get their money, they concluded they didn't want it, and the few who drew out returned in a few hours and put it back again.

And so the auto saved the bank.

Doves of Peace Are Messengers of War

How Japan Has Established an Efficient Pigeon Service in a Short Time

From earliest history the carrier pigeon has played an important part in the fortunes of war and in other troublous times and now, when she has a powerful rival in wireless telegraphy, she still wings her long flight far above the confusion and din of battlefields and carries safely the important messages on which hang mighty issues. What she carries matters nothing to the dove; it is not man to whom she is faithful, but home ties. Her gentle breast knows no other goal—she is speeding homeward. But to the weary, suffering army the safe delivery of the message may mean everything. Even when wireless telegraphy shall have been proven infallible for that purpose and it shall have been demonstrated that outside parties cannot intercept messages not intended for them, the mighty nations of the earth will consider the culture of the best strains of these birds an important item in military affairs.

Russia has long had an established carrier pigeon service and it has been of incalculable aid to her in sending messages from her beseiged fortress, Port Arthur, to her generals in Manchuria. The birds were collected from outside lofts months ago and taken into Port Arthur to be liberated as needed and they have been the surest messengers of all.

Five years ago had this war overtaken Japan she would have been entirely unprepared in this particular; today her pigeon service is the equal of any in the world. With the remarkable care even in minute particulars which has elsewhere distinguished her, her naval officers sought for and purchased the choicest, most reliable strains of birds the English market could afford. These were, of course, kept for stock purposes, for had they been released they would have attempted to return home. They soon became acclimatised and as they are very prolific the Japanese naval and military lofts, extensively established were soon filled with young birds; so young that the lofts to which they had been taken became homes to them to which, amid any and all conditions their strong instinct would henceforth guide them. The birds reared in the Oriental climate soon displayed a swiftness in flight which outdistanced pursuing hawks. The clear, dry air of the country is favorable to them and in some respects they are now superior to their English forebears.

All Japanese war vessels have pigeon lofts and every vessel that leaves port carries a wicker basket containing birds from coast lofts by which messages may be sent to land. In the present war the Japanese were at a disadvantage in that the scene of the war and marches was in a strange land where they had no established lofts. To overcome this they contrived a system of traveling lofts which displays great ingenuity. These traveling lofts contain young pigeons barely old enough to be taken from the home nest and are carried with the army on the move for two months or more. Then the lofts are removed to a temporary post and the birds released. In a short time they become familiar with the country for miles around and the place becomes home to them. After that they may be sent out with scouts to bring back reports of observations. The scout carries as many as six birds in a bamboo cage slung over his back. Oft-times information which these birds bring is sent on by other birds.

The message itself is written on specially prepared rice paper and enclosed in a little celluloid case which does not weigh over 62 grains. This case is fastened by two clips to one of the pigeon's legs, and during flight is held close under the bird's tail. When a bird returns to a Japanese naval loft it enters an outer cage and passes into a long box which opens into the loft. A glass door closes the opening into the loft, however, and the weight of the bird tilts the box so that a shutter falls behind it and it is caged. At the same moment an arrangement of electric bells announces its arrival and these continue ringing until the bird is released. When the message has been removed the bird is allowed to remain in the loft fully as long as it has been away from it.

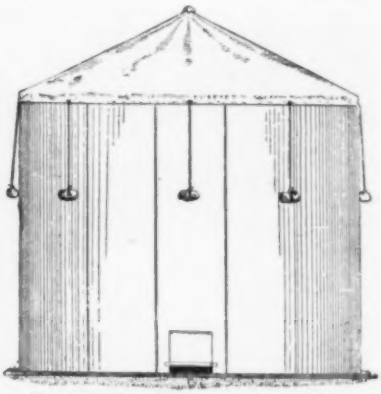
Pigeons are strong enough to fly distances of a hundred miles at the age of three months. Over land their flight is circling, but when liberated at sea they rise to an altitude of 1,400 feet and shape a direct course. An average speed is 50 miles an

CYCLIST SCOUT WITH PIGEON
PIGEON LOFT WITH FIELD FORCE
BASKET for CARRYING PIGEONS
THE WAR PIGEON
SCOUTS LIBERATING BIRDS WITH MESSAGES
OFFICER WRITING MESSAG
MESSAGE HOLDER ATTACHED TO PIGEONS LEG
METHOD OF TRAPPING THE BIRDS ON THE BATTLE FIELD

hour, or under very favorable conditions 80 miles an hour. For distances of 300 miles the average rate varies little. They are usually liberated at an early hour as they cannot see to fly well in the dark.

PORTABLE GRAIN BIN.

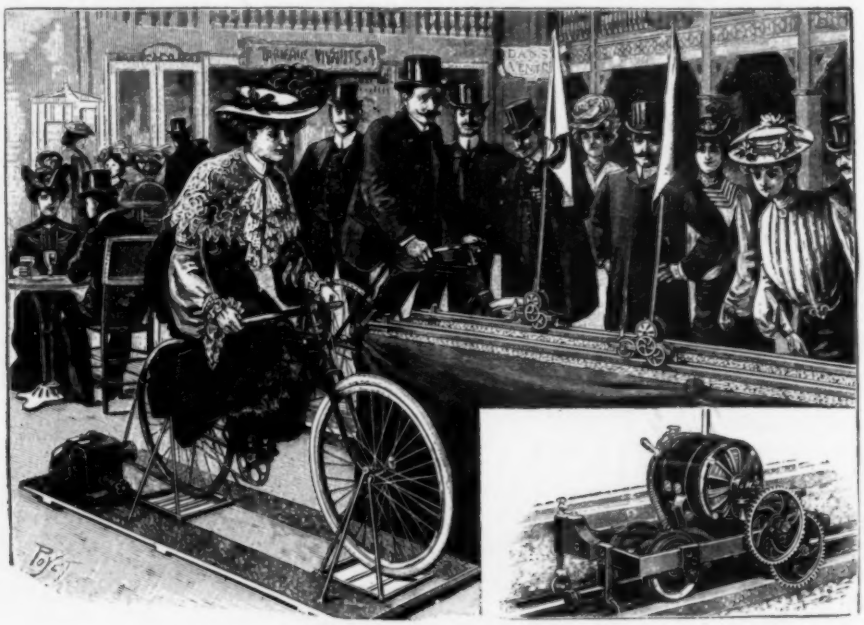
A year ago we published a picture showing a pile of 30,000 bushels of wheat lying on the ground in Oklahoma, with no covering whatever. The elevators were overflowing, and it had been hauled many miles to a railroad. There was nothing to do but dump it alongside the track until cars could be secured. The case mentioned was only one of many. A recent invention growing out of this emergency is illustrated, showing a portable grain bin made to contain 2,000 bushels which can be set up in a short time. The sides are galvanized iron, the floor heavy plank, and the top waterproof canvas.



Portable Grain Elevator

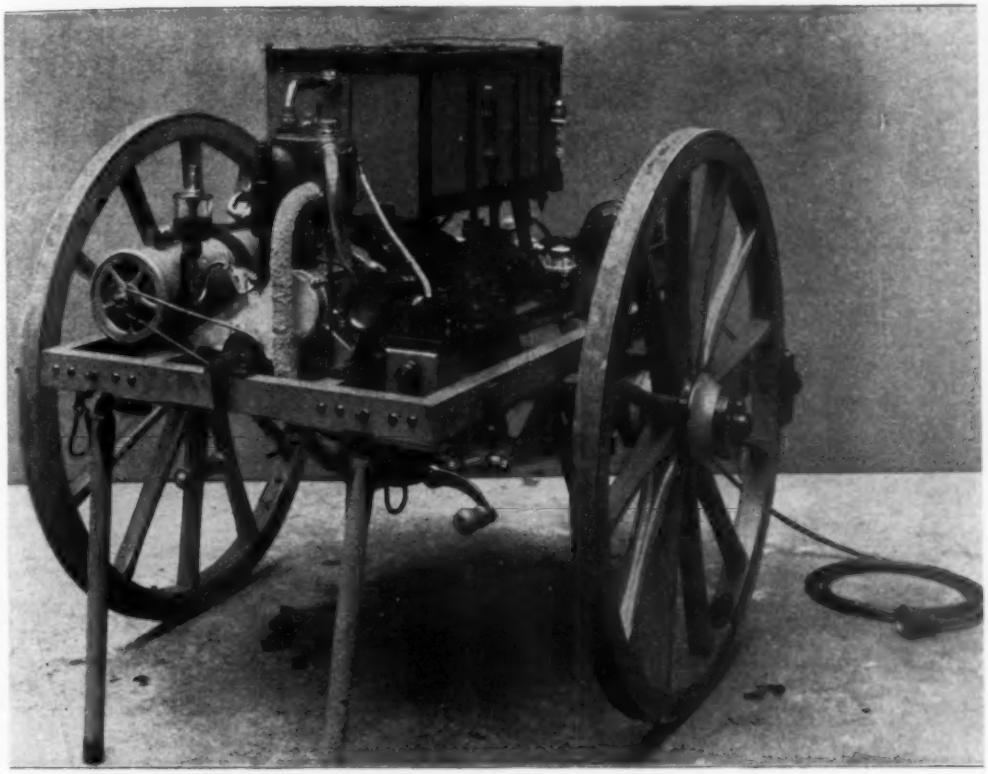
Stationary Bicycle Race

To run a bicycle race without leaving the place where you start is the latest craze in places of amusement in Paris. The illustration shows how it is done. The wheel is fixed in a frame fastened to the floor. When the rider begins to pedal, a belt from the rear wheel drives a small electric generator. The current thus produced is conducted to a motor on wheels and carrying a flag. The track on which the motor travels is marked in distances and each foot of track requires as much work by the rider as would have carried the bicycle one mile had it been free to run as under ordinary conditions of use. In the picture the woman is about two miles ahead.



Stationary Bicycle Race and Recorder

Armies Will Use Portable Space Telegraph Stations



The Portable Power Station

Already tests of wireless telegraphy for military purposes are being carried on by the great military powers of the globe. While the Russo-Japanese war is proving that this use of the great invention is practicable, it also is giving rise to many questions and perplexities and will necessarily entail an endless succession of experiments before the world knows just how much wireless telegraphy is to be relied upon in any crisis.

The Germans are now carrying on interesting experiments with portable space telegraph stations for military purposes. These stations are arranged for a short and a long wave length, the antenna remaining the same in both, but oscillating in the short wave three-quarters of a wave, while in the long one it oscillates one-quarter of a wave. In the short wave the antenna is overbalanced by a counterweight of 65 square feet of copper gauze stretched out about 3¼ feet above the ground, while for the long wave 260 square feet of counterweight are required. Kite balloons about 355 cubic feet in volume, with a pull of about 6⅘ pounds, support the antenna.

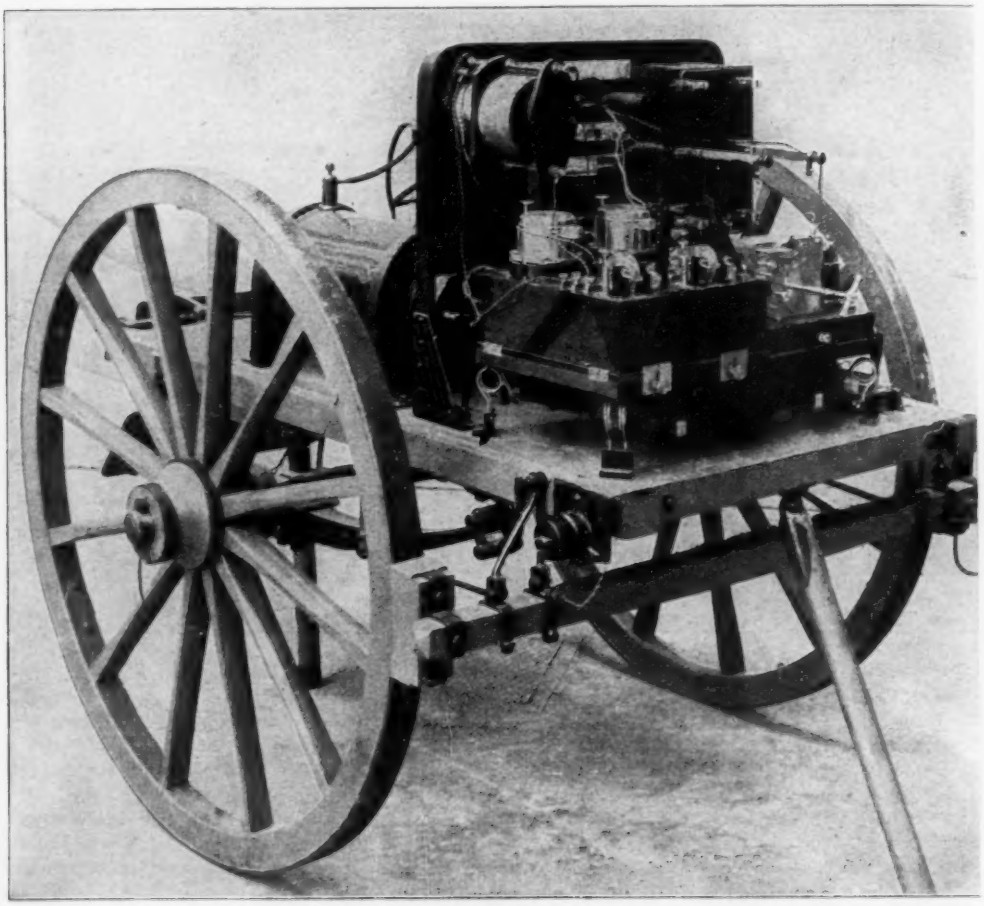
Each station comprises three two-wheel carts. A power cart containing a 4-horsepower gasoline motor direct-coupled to an alternating-current generator of an effective output of about one kilowatt and an exciting machine, which apparatus constitutes the current source. A reservoir located above the machinery contains water for cooling the motor; the water is circulated automatically by a small pump, and a tube system and a ventilator cool the water. Gasoline for operating the motor is carried in another reservoir of about 8 gallons capacity, sufficient for a continuous telegraphic service of 30 hours. The exciting dynamo of the alternator automatically charges the accumulators which operate the

electrical ignition device. The balloon is pulled in by means of a conical friction coupling, which, by a chain transmission, causes a cable drum to rotate.

The apparatus cart carries both the sending and receiving appartus. It is divided by a frame into two compartments, the front one containing the induction coil, a battery of Leyden jars and a high-tension transformer. It is protected from contacts and accessible only through a trap on the side wall. The Morse key occupies the back compartment. Two receiving apparatus and a Morse recorder are on a board supported by strong springs, while on the table of the recorder is located the small transformer. The large transformer, the receiving plug and counterweight switch with two levers are arranged on the frame in the middle of the cart. A side wall carries a telephone and electrolytic detector and the door is provided with an alarm bell.

The balloon, gas reservoir, reserve gasoline reservoir and trenching tools are carried by an utensil car. The gas reservoirs are built into the cart.

With this outfit safe communication up to more than four days' marching is possible, while in the case of an audible record of signals the distance susceptible of being covered may even be double. The portable stations are adaptable to naval use also, and are the same as were used in signaling the progress of automobiles in the Gordon Bennett race of this year.



Apparatus Cart.--Portable Space-Telegraph Station for Military Purposes

A new process converts the fiber of asbestos into a cloth like silk.

AMERICAN TURQUOISE IN EUROPE.

The American traveler who buys turquoise in Italy little realizes the fact that most of it comes from America. He could have bought the same turquoise cheaper in his own country, but the American likes to be "duped." Most of the turquoise sold in this country and in Italy comes from the mines in New Mexico. The American product is gradually but surely displacing the Oriental stone. The colors of the American turquoise are not only more to the taste of the connoisseur, but are more permanent, the fading of a New Mexican turquoise being a very rare occurrence.

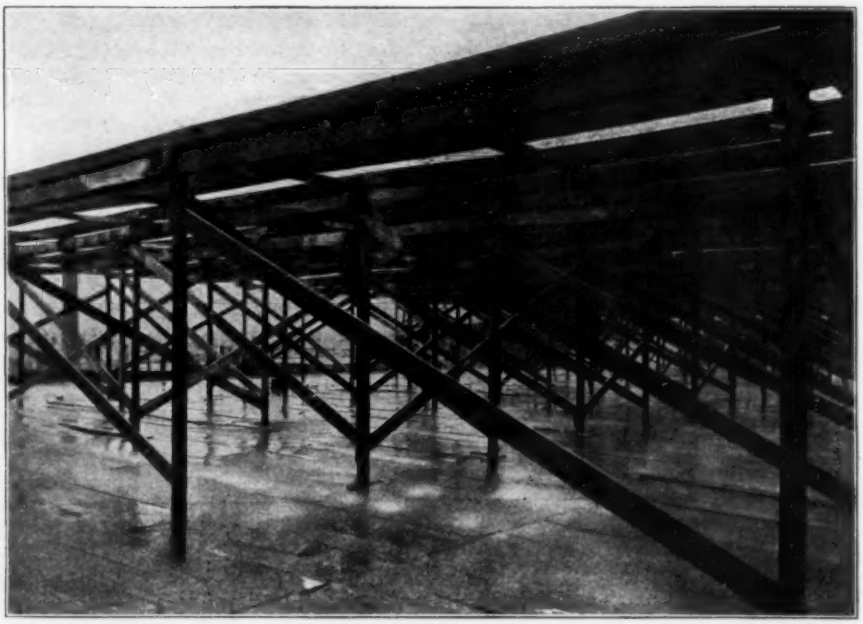
Turquoise mining in New Mexico is of very remote origin. Many of the present mines when located indicated operations by the inhabitants of New Mexico at a time prior to or contemporaneous with the Aztecs, stone and earthen vessels of great antiquity being found in the workings. The rarest specimens of the wampums of the New Mexico Indians contain beads of turquoise, many of them being gems according to modern standards. One of the most successful of the New Mexico mines is located near Los Cerrillos.

HOW SALT IS PRODUCED IN OHIO.

Salt in the United States, of which our annual production is close to 21,000,000 barrels, is obtained by various methods. In some states it is mined like so much ore or coal. It is obtained from the ocean waters by operations of evaporation and crystallization. Shallow vats covered by sheds and covering acres of ground are often used in open-air methods of evaporation in salt-making. Once made, salt is stored in vast quantities, such as that shown in the photograph, which represents not less than 20,000 tons, standing in a building 250 feet long by 135 feet wide. This photograph, together with the one of the cooling tower, pictures the industry in Cuyahoga county, Ohio, a notable salt-producing center. The method of production there employed is herewith described:

Twenty Thousand Tons of Salt in a Storage Warehouse

Wells lined with casing pipe are sunk down into the rock salt, which lies in a strata in the valley of the Cuyahoga river, and at a depth of 1,500 feet or thereabouts. The diameter of the wells is 6 inches. Brine containing 25 per cent of saline matter is brought to the surface by forcing water down one pipe by means of pumps, this



The Immense Coaling Tower Used in Preparing Salt for the Market

water coming up in a parallel one, bringing the salt with it. The forcing of the water is necessary on account of the specific gravity of the brine. After being brought to the surface, the brine is piped to wooden vats, 120 feet long and 15 feet in width. Then after being freed from sediment it is conducted to vacuum pans, where by means of steam pipes heat is supplied from within, the brine boiling and vaporizing at a temperature of 120 degrees. The brine is made to circulate freely within the vacuum pan. With the concentration of the brine, the fine grain salt leaves the pan and is carried in its slushy form to bins, where it is drained. Later, in revolving dryers it is subjected to hot air blasts.

By means of the cooling tower upon the roof of one of the salt-making establishments, the same water is used over and over again in condensing the vapor from the vacuum pans. Water once used is carried to the roof at a temperature of 120 degrees. It first enters troughs 10 feet above the roof, from which it is later distributed to the roof beneath. It is returned to the pan at a temperature of about 60 degrees.

Modern methods have revolutionized salt-making until now the best grades, it is said, often contain less than one-half of one per cent of impurities. The United States having outranked Great Britain within the past seven years, now leads the world in the production of salt.

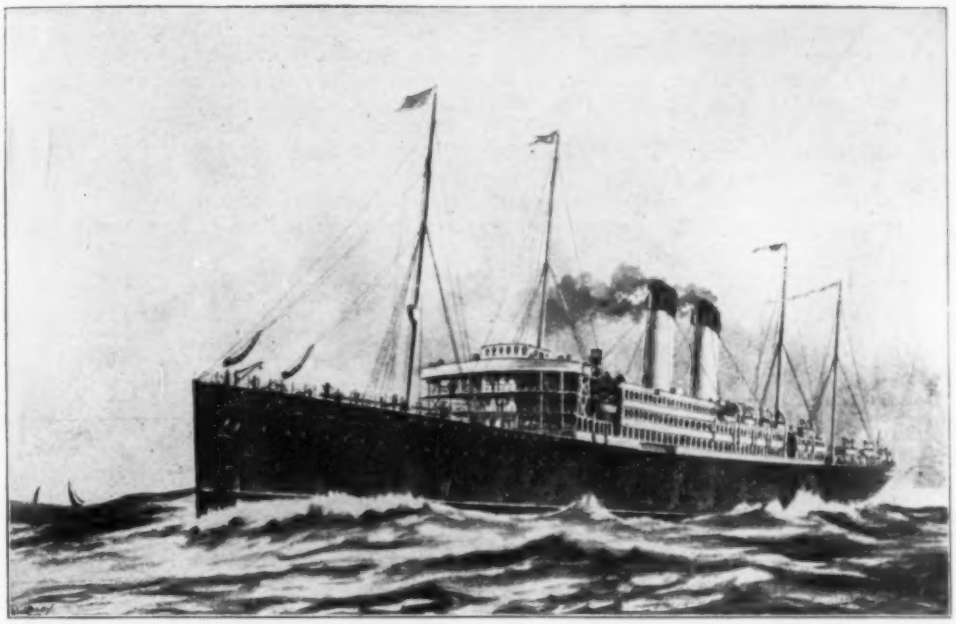
AUTO PROPELS A FIRE ENGINE.

To save a town from flames an automobile with a fire engine hitched to it made a mad run from New Washington, Pa., to Springdale, Pa., over 15 miles of country roads. When the engine arrived it was found that the hose would not fit and several houses were burned before the fire was extinguished, but the long, hard ride showed what an automobile can do in an emergency.

GREAT SALT LAKE SPANNED BY AN AERIAL CABLE.

An aerial telegraph cable 35 miles long and carrying 19 wires is to be stretched across the Great Salt Lake by the Southern Pacific and Western Union railroad lines, and over this aerial line will pass all the commercial-telegraph business between Salt Lake City and the western coast. The waves and high winds necessitated the cable.

Largest Vessel Ever Built Makes Her First Trip



The White Star Liner "Baltic," the Largest Vessel Afloat

The White Star liner "Baltic," which has completed her initial trip across the Atlantic waters, is the largest vessel ever built. She is 725 feet 9 inches long, 75 feet beam and 49 feet deep; her displacement is 40,000 tons, and she is nearly three times as heavy as the largest battleship in the English navy. Her speed (average, 17 knots) is moderate, but her accommodations are comfortable and luxurious. The grand dining salon, which is situated on the upper deck and extends its full width, is very handsome, and will seat 370 people. The Shipping World, London, says: "She is by far the largest vessel afloat, having a gross tonnage of 24,000 tons, and exceeding by 3,000 tons the 'Cedric' and 'Celtic,' which have hitherto eclipsed in size all other vessels afloat."

The "Baltic" can carry 3,000 passengers and a crew of 350. The smoke-rooms, promenades and libraries of each class are fitted up most luxuriously. Rooms en suite may be had by those willing to pay for these greater luxuries. The engines of the vessel are so balanced that vibration is almost entirely done away with. The heating and ventilating arrangements are most complete. She is provided with large refrigerating chambers, and in every detail represents the most modern type of commodious ocean liner.

Her cargo capacity is for about 28,000 tons, and her winches and other loading and discharging arangements are of the latest and most efficient type. She has a carefully planned system of water-tight compartments, and carries several important safety devices. One of these is an electrical indicator for preventing collisions, which indicates the exact position of any other vessel entering its magnetic zone, a radius of five miles. Other devices are the electrical lead and log, which indicate the speed of the ship and the depth of the water at 10-second intervals.

The "Baltic's" first trip occupied 7 days 13 hours and 3 minutes, and her 48 furnaces consumed 235 tons of coal per day.

China's one electric railway is 30 miles long. A 90-mile line is now proposed which will connect Shanghai, Hangchau and Suchau, cities of over a million each.

Scenes from the Great Conflict

The bridging of the Yalu was planned with wonderful foresight and system. When the Japanese were ready to use the bridge, not a part essential to the success of the venture was lacking. For many a day a long line of light transport carts, in charge of coolies, was bringing the great number of planks needed for the bridge over which the intrepid soldiers were to march, many of them to death.

The Japanese use the men who do not quite come up to the physical requirements for soldiers, as coolies for all such preliminary work, and this has wonderfully aided them.

Coolies Moving Planks on Light Japanese Transport Carts to Bridge the Yalu

The Russians declared that while scarcely a building may be left standing in Port Arthur, the fortress would never fall. The scenes within the city were such as would strike terror to the bravest heart. Hardly a whole pane of glass remains in any building, the streets are filled with debris and the shattered buildings with the wounded.

While the fighting was going on at Wolf Hill, north of Port Arthur, eight trains were kept busy bringing the wounded into the city. Vehicles of every kind were utilized, and many came on foot, though sorely maimed; many fainted by the way, too weak to go on.

The Cossacks, with their fierce mien and superior stature, well-mounted and world-famous for their bravado, make an impressive and formidable array beside which the Japanese might appear at a decided disadvantage.

But if the "yellow dwarfs," as they have been derisively termed, suffer in point of physique, they have far eclipsed their famous opponents in point of bravery, daring all things for the success of their cause. Bitter, indeed, it must be for the imposing Cossack colonel to surrender to these despised troops of infantry. But the scene has been enacted again and again, often with a strategical wit and a power of resistance on the Cossack side most conspicuous by its absence.

When, after two days' severe fighting, the Russians began to evacuate Newchwang, they left little behind them for the victorious Japanese. Buildings were totally demolished, the railway station was fired, and the heavy siege guns dismantled and made utterly incapable of further use.

The losses on both sides were heavy, but from the first the victory was with the Japanese. Their firing line, it is said, extended fifteen miles, and the storm of shot and shell did not cease until the last plain and hill had been swept clear of the Russians.

A church-car is in use on the Trans-Siberian line, which has the appearance on the interior of a beautiful cathedral. From chancel to windows every detail is carried

"Within the Beleaguered City Terrible Scenes Were Enacted, the Streets Were Filled with Debris and the Shattered Buildings with the Wounded"

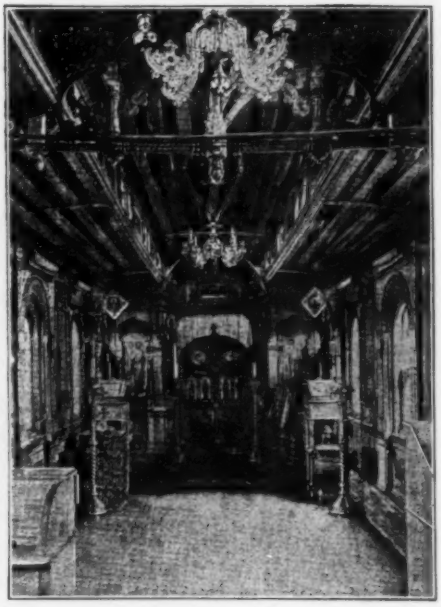
A Cossack Colonel Captured by Japanese Infantry

out and no Russian could ask for a place of worship more in keeping with the spirit of his rites.

When the work of constructing the great Trans-Siberian Railway was going on the chapel-car went with the employes of the

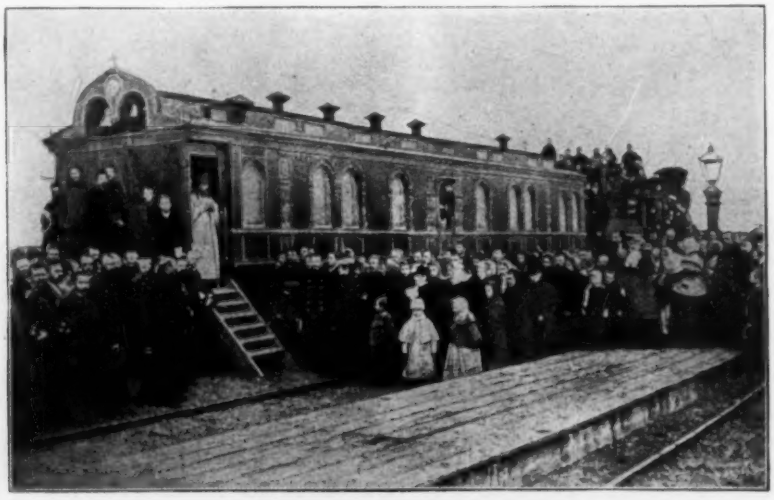
Russians Dismantling Siege Guns at Newchwang

road and was in constant use by them as they slowly advanced across Asia. The fact that the most uncouth, the roughest,



Interior of Church Car, Trans-Siberian Railway

the most brutal Russian must have his place of worship presents a strange condition of affairs. No other country, probably, has greater internal disturbances, no other rulers have more to fear at the hands of the people than do Russian officials, and yet everywhere we behold these people bowing down in worship. Superstition rather than religion is the impelling force, however.



Exterior of Chapel-Car, Trans-Siberian Railway

A Furious Fight in the Russian Trenches at Port Arthur

The Japanese in battle are like demons turned loose. They stop at no obstacle; they rush into the very jaws of fate with death-dealing thrusts, dying themselves, perhaps, in the encounter. Once scorned and despised by the Cossacks, they now are feared and hated. Yet if the Japanese is a demon in battle, he goes quite to the other extreme in the presence of sickness and injuries, and with a sublime forgiveness ministers alike to friend and to the foe, who has been so brutal to Japanese slain.

PEANUT OIL, ITS MANUFACTURE AND USES.

Making oil from peanuts is a growing industry in France. The oil is used as an edible, as a lubricant, and for making soap and other purposes. The makers of French toilet soaps, however, are the most liberal purchasers. The meal that is left after the oil is extracted is sold for cattle feed, as which it is keenly appreciated. Marseilles is the great market of the country for the peanut oil and meal.

Before pressing the peanut, the kernels are freed from the red cuticle by a winnowing process. Some Americans who have experimented in manufacturing the oil, pressed this red skin and the nut together and as a result the oil was extremely bitter. Often the nuts are subjected to three pressures, but the best oil comes from the first pressure. The standard size presses are used in Marseilles, in one of which the hydraulic pressure is about 1,102,300 pounds force. In most factories the meal, after being removed from the press, is placed in horsehair bagging, and sometimes it is placed in steel boxes without any wrapper.

OUTTURNING PROPELLERS FOR BRITISH VESSELS.

An important change will be made in all British naval ships built in the future: the engines will be so designed that the screw propellers will turn outward instead of, as hitherto, inward. Inward turning screws cause a loss in maneuvering qualities and in propulsive efficiency, it is stated, and the fact has been noted both in Italy and in France.

Inturning screws allow the engineer a good view of the engines at all times, and to secure this feature with the outturning screws heavy columns must be built in front of the engines to take up the thrust of the crosshead and connecting rod. The added weight of these columns is an important consideration in building warships. In naval machinery round forged steel columns are used and the engineer can see all parts at a glance. The new cruisers will have the starting platform in the wing of the ship and the back columns of the cast-iron form with slipper guides for the thrust of the crossheads and connecting rod will be placed next to the longitudinal bulkhead.

FELL 800 FEET AND SURVIVED.

Sensation is One of Pleasure—Consciousness Remains Until Striking—Heard His Own Fall.

Nature seems to wrap some of the most awful tragedies of life in pleasant dreams and soothing melodies. The old theories regarding falling from a deadly height were that the victim quickly lost consciousness by the rapid descent, and the terrible impact at the last was painless because of nature's anesthesia. Recent studies of the subject, however, prove that sense of pain is absent, the mind, sight and even sense of hearing remains as long as the body is descending, then the curtain falls on all sensibility.

An article contributed by Prof. Heim to the Psychical Review gives an interesting account of the sensations of falling from a great height. Prof. Heim has collected reports from those who fell from great heights and survived, and he has come to the conclusion that the experience is rather pleasant than otherwise.

The man who is falling from a great height has no pain, no fear, no sensation of despair. On the contrary, although fully conscious of the terrible danger of his position, he is calm and so resigned that he can review the causes of the mishap with perfect control of his thoughts. Toward the end of the headlong descent, the victim hears wonderful melodies, and, he feels as if he were floating into heaven, borne on rose-colored scented clouds.

He loses consciousness at the moment when he strikes the ground, but feels no pain whatever. The sense of hearing apparently remains in activity longest, for men who have survived falls of this kind state that they can distinctly remember the thud made by striking the ground.

The well-known Alpine climber, Sigrist, wrote as follows to Prof. Heim:

"When I fell from a great height on the Capfstock in the Swiss canton of Glarus, I retained full consciousness. I felt no fear but I had the sensation of floating downwards agreeably and safely. I was able to think calmly about my own position and hastily reckoned up the means left for my wife and family to live on after my death. When I struck the ground I became unconscious without the least sensation of pain."

Prof. Heim adds notes of his own feeling when he fell 800 feet and only escaped death by dropping into deep snow at the bottom. He writes:

"I did not lose my breath, but I thought clearly about my death. I pondered over the way in which it would be received by my relatives, and the copy which they would supply the newspapers. I speculated on the length of my own obituary notices. I heard wonderful melodies and I experienced a feeling of perfect peace and rest. When I recovered consciousness, two hours later, I could remember nothing about the actual contact with the ground, except that I had seemed to run against something black. I felt no pain whatever.

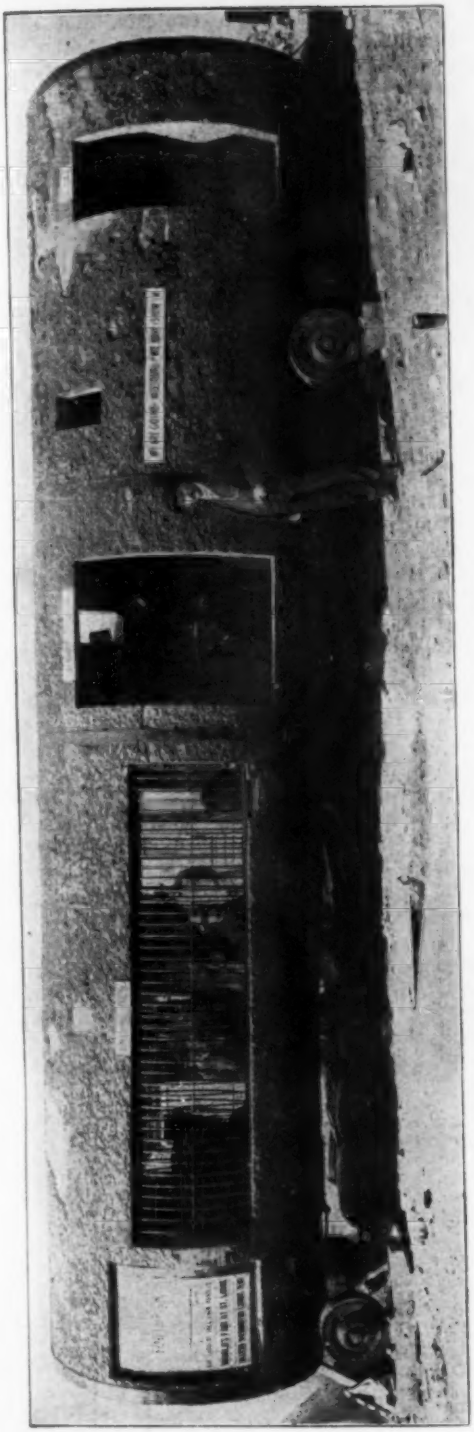
A NEWS BUREAU RUN BY TELEPHONE.

A telephone information bureau is conducted by a big Philadelphia daily to the satisfaction and great convenience of all the line's subscribers. No difference what the question to be settled, from the price of potatoes to the important matters of the day, the telephone bureau does its best to answer it correctly in the shortest time possible. Many hundreds of people of every class and calling call up the bureau every day and one and all are impartially answered.

The switchboard in use consists of a horizontal energy board and is equipped with twenty incoming trunks and one outgoing trunk, says the American Telephone Journal. The instrument equipment consists of seven portable desk sets and four breast plate transmitter sets; all having head band receivers. The board is so arranged that it can be operated with one or twenty operators, as needed, by means of switching keys. A party calling up the bureau is connected with a trunk that is not busy bringing up the lamp signal. One of the operators takes up the call and receives the query. When possible, the answer is given at once, but if it is necessary to look up the answer, a shunt key is thrown into circuit holding the signals at the telephone office.

The average number of questions received and answered in one day is over 2,500, and on special occasions it has reached nearly 4,000.

The head of a big automobile concern puts the sum total of the automobile business for this year at $24,000,000, or twice the amount for last year. Business vehicles are to receive the special attention of manufacturers next year and the figures for 1905 will probably see an even greater increase.



TRAVELS TO THE WORLD'S FAIR IN A LOG.

Across the western country from Gray's Harbor, Wash., to St. Louis, Mo., has lately traveled the most remarkable car that ever struck the rails. Before it was prepared as an exhibit for the Louisiana Purchase Exposition it formed a considerable portion of the trunk of a gigantic spruce tree that stood 271 feet in height and was the converging point of two trails that led from the heart of the mighty wilderness, and which the feet of numerous red men years ago wore hard and smooth as they assembled beneath that generous shade in council.

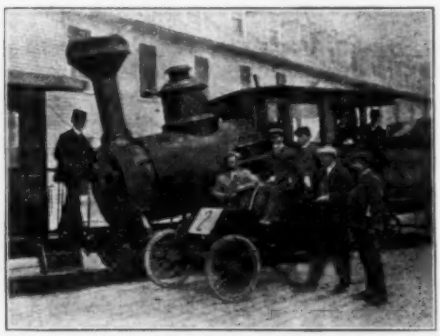
For 450 years, from the early days of American discoveries to the present time, it had safely withstood the warring elements.

From the base of the trunk to the first limb the tree measured 118 feet, and 40 feet above the base it was severed, its diameter at that height being 11½ feet. In making the car for the Exposition, 9 feet was the largest diameter the railroad would permit because of bridges and tunnels which would not allow of a wider car. Therefore 36 feet of the 9-foot trunk was hollowed out to form a reception hall, an office, an animal den and a register. In the animal den were caged animals from the Washington forests, including a man-attacking cougar and a bear. In the other apartments are a table, a chair, desk and two large couches carved out of the log and beautifully polished, showing the natural grain of the wood. In the reception room is a piano, and the capacity of this room is for 30 people. Three doors give entrance to the log while a number of windows afford plenty of light. Over $8,000 was expended in chopping down the tree, "logging" it to the Chehalis river, pulling it from the river and preparing it as an exhibit; to this expense must be added the cost of transportation. The log weighs 32,000 pounds; it has been placed on heavy trucks and it would require from eight to ten teams to haul it. The idea for the exhibit originated with Wm. Hepfinger of Aberdeen, Wash.

Within this novel "special," John P. Morgan made his long trip to the Fair, and later will go on to New York in order that the huge log may reach the eastern coast. The exhibit will probably be taken to Europe. Sections of the tree have been sent to the Royal Park, Stockholm, Sweden; Central Park, New York, and the Smithsonian Institute, Washington, D. C.

AUTOMOBILE CONTEST GOAL AMONG THE CLOUDS.

Climbing Mt. Washington in record-breaking time is a harmless little sport that



Auto and Rack Railway Locomotive at Top of Mt. Washington

automobilists have taken up with considerable zest, and the enthusiasm and delights of the annual international contest hardly surpass those to be found in the daring dash which lures death at every turn. At the signal to start the mechanician and the driver forget everything but the speed to be maintained, and up the rugged road, which is open to automobilists but once a year, plunges the car. On, on and up it goes, careening past dreadful precipices where a single swerve would hurl it to destruction, now in the shadow of some towering ledge with unknown obstructions around yonder curve. With every pulsation the loose rocks and boulders go hurtling down the yawning abysses and every yard forward brings nearer the billowy clouds, which finally swathe the car and occupants in mists and mystery, and then, before it is realized, the finish is in sight and the air, at the altitude of 4,600 feet, resounds with cheers. Has he broken the record? Yes, the shortest time yet made. But the triumph is shirt-lived, for a few moments later another panting vehicle comes in with a shorter record yet.

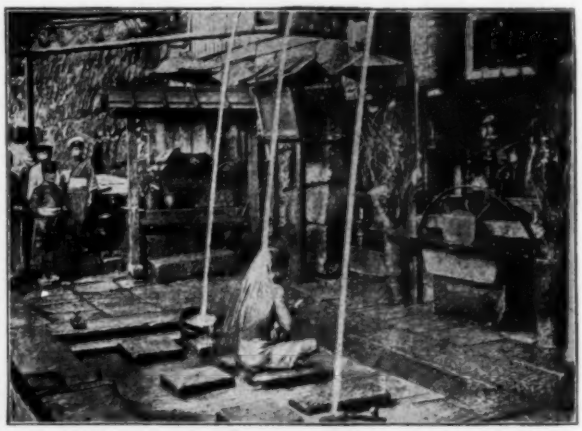
This year Harry Harkness, driving a 60-horsepower $18,000 Mercedes car which weighs 2,200 pounds, made the 8-mile ascent at the rate of 20 miles an hour or in 24.37 3-5. The nearest approach to this record was made by F. E. Stanley with a 7-horsepower steam auto. His time was 28:19 2-5.

For several days automobiles and motorcycles joined in the contests, and even the old rack road locomotive broke its own record by making the descent one day in 50 minutes, 5 minutes less than its shortest previous record. A drizzling rain did not dampen the spirits of the automobilists, but it seems that the descent did. Some left their cars for their mechanicians to bring down and themselves took the safer route by rail. The descent was hard on most of the cars, in some makes the brakes hardly affording sufficient clutch, and it was necessary to water the brakes. The average grade of the 8-mile climb is 17 per cent.

WASHING THE LIES OUT OF A JAPANESE BOY.

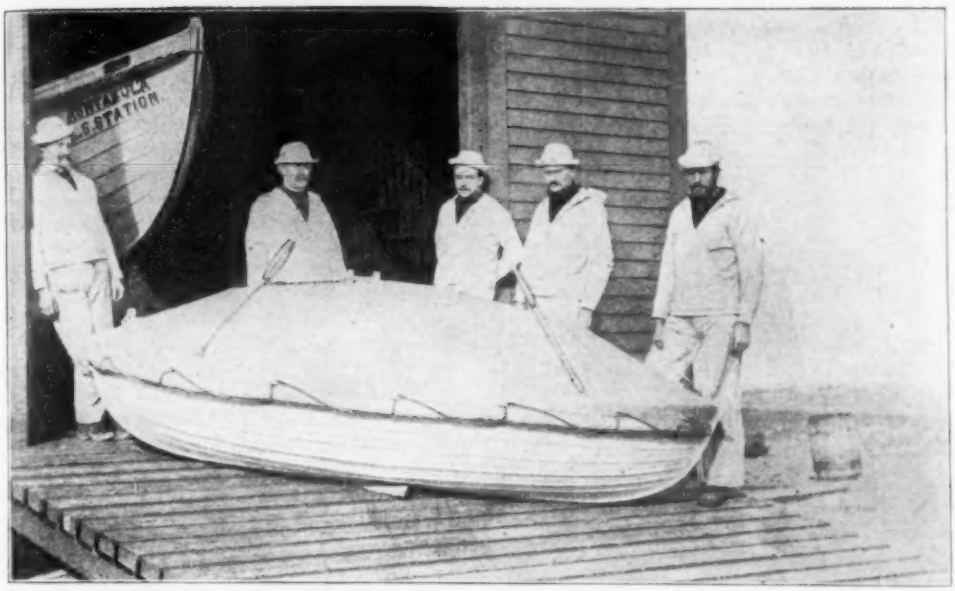
The Japanese youth's religious training, although it includes many heathen rites and beliefs, is much better cared for than the average American boy's. Every morning at a shrine in his home where is enthroned a family saint or one of the Seven Gods of Riches, the little fellow makes his offering of a cake, a little rice and a sprig of green, and at night he lights a little lamp in front of it.

But the strangest of all the observances is his method of cleansing himself from various sins by means of water. The boy in the illustration had told many lies, therefore he seated himself for a time under the stream of water just so it dashed against his neck and bare back. Let any American boy try it as a cure for lies and see how he likes it.



Japanese Boy Before a Shrine Having His Lies Washed Out

New Type of Lifeboat.



This life car is made of galvanized iron, and is drawn out to the wreck by a life line fired from a cannon on shore. It is about ten feet in length and will hold four people. After the persons to be rescued from a shipwrecked vessel are placed within through the entrance at the top, (as shown by one of the crew, in the cut) a covering is placed over the opening, thus allowing the waves to dash over it without even wetting the occupants.

RAILROADS OF THE WORLD.

Figures have been compiled showing the miles of railroad in the world at the end of 1902. The difference in the number of miles of track between the New World and the Old will cause surprise to many Americans:

Europe	183,997	North America	233,186
Asia	44,358	South America	28,822
Africa	14,554	Australia	16,038
Old World	242,909	New World	278,046

This makes a grand total of 520,955 miles for the whole world, of which 53 1-3 per cent is in the New World and 44¾ per cent in North America.

The Railroad Gazette says: "The additions to the railroads of the world for seven successive years have been, in miles: 1896, 9,796; 1897, 10,747; 1898, 10,864; 1899, 13,533; 1900, 10,800; 1901, 16,551; 1902, 13,338.

"This gives a total of 85,629 miles for the seven years, being an average of 12,233 miles per year. The average mileage built was greatest from 1880 to 1890, when it was 15,218 per year."

COSTS MONEY TO LAND IN PANAMA.

Immigrants to Panama over 18 years old are required to pay a tax of $4 if a first-class passenger and $2 if a second-class passenger within 24 hours after landing. If this is not complied with the agent of the vessel landing them is subject to a fine of $4 for each foreigner landed. The laws regarding criminals, diseased persons, anarchists, etc., are very strict and authorities violating them incur heavy penalties.

The question of an automobile emergency hospital for Chicago's downtown district is being agitated. If the plan succeeds the movable hospital will also serve as a free dispensary for emergency cases.

NEW SCHEME OF DESERT TRAFFIC.

Cairo Firm Hitches Camels to Queerly Constructed Carts

The Oases Syndicate of London has inaugurated a new method of desert transportation. It is to hitch a camel to a cart and haul the traffic in the cart instead of on the camel's back. The illustration shows the first cart to be drawn by camel

The Ship of the Desert in Harness

traction across a desert. The trip was made successfully from Cairo to Kargheth Oasis. The carts were built at Cairo. They are two-wheeled, as experiment proved that the powers of the camel can best be utilized by causing him to take a certain amount of weight on his back. The wheels are 5 feet in diameter, with ordinary felloes of oak, spokes of ash and a ⅜-inch tire. Outside this tire is shrunk and bolted on a 5-inch sand tire 3/16 inch thick. Sloping pieces of light timber are screwed on to the felloes so as to prevent sand from lying on them in soft ground. The sides and ends are movable. The carts carry more than two tons each.

NO MORE THE TOWPATH.

The canal towpath, famed in song and history as the starting place in life for many of our greatest men, including one president, is not likely to furnish any more. The plodding mule is going to give place to the electric mule and the barefooted boy who wielded the willow switch to an electrician who will use a switch of entirely different construction.

The trolley on the canal promises to revive the old time system of transportation, and to again bring into service hundreds of miles of waterway which have been practically unused for years.

DERAILED FREIGHT TRAIN WRECKED A BRIDGE SPAN.

A derailed freight car wrecked a span of a big bridge of the Lehigh Valley Railroad not long ago so that the entire span, 164 feet long, fell into the river, carrying with it a number of freight cars.

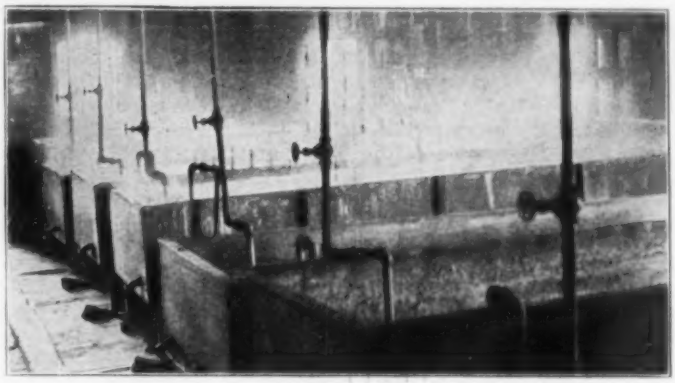
The bridge consists of eight through spans of moderate length, two trusses to the span, carrying a double track and crosses the Susquehanna just south of Towanda, Pa. A broken wheel flange caused the derailment of one car of the south-bound freight when about 300 feet north of the bridge. The car struck the inclined end post of the bridge, breaking it in two. The span fell into the river, badly broken up and all the rear part of the freight except four cars ahead of the caboose went down, the track rails holding together and pulling about 50 feet of track off the grade into the river. No one was hurt, though two tramps who were in the last car over, which remained tilted on the pier, had a bad scare. A temporary trestle was erected and traffic, which had been transferred over a public bridge one-half mile south, was soon resumed.

Wrecked Span of Towanda Bridge

How Cheese is Made

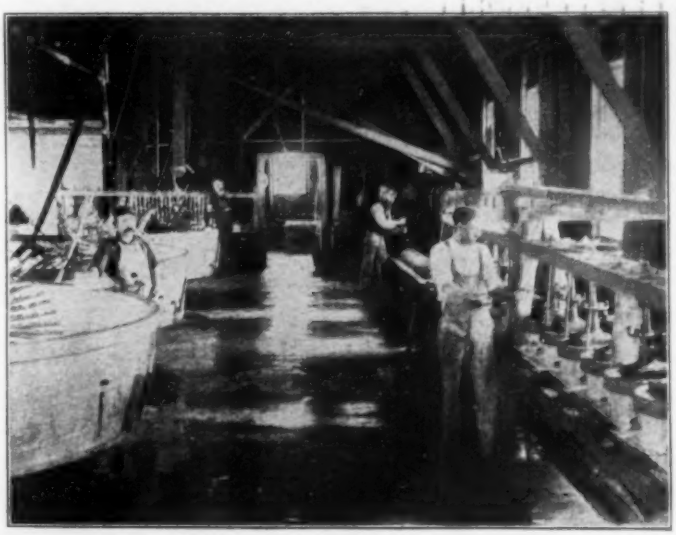
Sugar of Milk Also a Profitable By-Product

There has been a marked evolution in cheesemaking since the early days of the industry when the farmers made curd at home and then took it to the factory to be pressed into cheese. Today the cheese factory is a place of modern invention and skilled labor, and in all modern industries the by-products are utilized. Sugar of milk is an important part of infant foods, and is also used in making tablets and pills.



Boiling Whey in Making Sugar of Milk

Milk is received at a modern cheese factory and is emptied into a receiving tank holding 600 gallons. This tank rests upon scales. After the milk has been weighed it goes through pipes into the vats within the factory. Milk received at night remains in these vats till morning, the souring process which is constantly going on in milk being conducive to cheesemaking, as is also the mixing, in the morning, of the sweet and slightly sour milk. Modern vats used in the cheesemaking processes are round in shape and contain about 7,000 pounds of milk each. Between the lining and the exterior portion of the vat there is a compartment into which hot water is piped from the engine boiler, and is kept at a temperature of 85 degrees or thereabouts, and serves to properly scald the milk. Rennet, a liquid made from the stomach of a calf, is used to coagulate the milk, a few ounces being sufficient for 1,000 pounds of milk. Today this rennet is bought by cheesemakers already put up in bottles. In early days it was made by the cheesemaker himself.



The Interior of a Cheese Factory Showing Vats and Presses

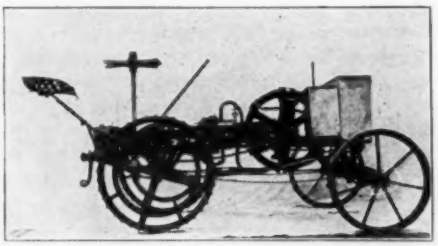
Machinery has now taken the place of cutting curd by hand, and also the work of stirring. What is known as an "agitator" is used for stirring, and, together with the curd knife, is run by steam

power. After the curd has formed and has been sufficiently cut to liberate the whey, a small piece of it is placed upon a hot iron. If it adheres to the iron it is ready for the presses. It is then taken from the vats and placed in telescopic hoops, drawn out to their full height. Cheese capping cloth is placed within the hoops and the curd fills them to the brim, after which the cover is put in place and screws, capable of raising a building, are applied. The hoops telescope as the pressing process continues and the curd becomes cheese. When taken from the presses the cheese is taken to the dryhouse and placed upon racks. What is known as a gang press, which will press twenty or more cheeses at once, is often used instead of the individual presses.

The whey, which is the recrement liquid from the cheese factory, goes by way of a trough to the sugar of milk factory nearby, and is placed in vats of 500 gallons capacity, where it is boiled. Next a small quantity of diluted sulphuric acid is added, which causes the casein and fat to separate and leaves the sugar liquid. The casein—the coagulable part of the whey—settles to the bottom, and the fat comes to the surface. The sugar liquid thus separated is emptied into tubs. Having been boiled down into a saline mass of brown color, it is ready to crystallize. Hard yellow crystals form about the sides of the tub and about a stick placed therein. The remaining liquid is again put into the vats to be boiled, and the crystals are removed by the aid of a hatchet and are placed in bins. They next go to the refinery. Here they are repeatedly boiled, crystallized and decolorized, and finally ground by machinery to powder form, when the product is ready for the market.

FARMING BECOMES A MECHANICAL OPERATION.

The farmer is fast becoming an engineer and mechanic, and the next few years will see the general use of traction engines for farm work.



A Handy Farm Automobile

On the farm of Louis Noltemeyer, near Columbus, O., a novel machine for everyday farm work has recently been successfully tested, and is now in use in place of horses. This machine is an auto traction engine, which is so fitted that Mr. Noltemeyer can hook to it two plows, a corn planter or other farm implements, and when occasion requires it can be converted into a wagon for hauling. It can also be used to operate a thresher, a pump or a drill.

The engine of this machine is water-cooled. It is 10 horsepower, but the gearing is such that the actual power developed at the wheels is equivalent to 40 horsepower. A much larger machine of the same kind will probably be built in the fall.

JAPS DRAW THE LINE AT MACKINTOSHES.

Japanese have demonstrated their willingness to wear American and European fair-weather clothes—they have adopted our style of neckwear, our make of coats, vests and in some instances our trousers—but they draw the line at the white man's mackintosh or rain coat. They say it doesn't keep off the rain, and so it is often occurring in Japan that the people will be attired in modern European clothes, but still wearing their old-fashioned rain coats of straw. The coats are light, comfortable and waterproof.

Members of the Anti-Russian League of Japan Wearing Rain Coats

How To Build a Telephone Line By Using a Wire Fence

50-Mile Telephone System at Marlow, Indian Territory--Story of Its Construction and Successful Operation Is Told By the Builder

T. P. Martin, Jr.

A wire fence telephone line will not give perfect satisfaction during wet weather as ringing is difficult owing to the grounding by the wet posts. However, in a dry climate like that common to the South it will work nicely. Such a line was installed and used by the writer for nearly two years. Thousands talked over the line and few dreamed that their important messages were going over a common barbed wire fence. The line was run on the right-of-way fences of the Rock Island railroad from Marlow, I. T., to Rush Springs, and from Marlow to Duncan, 10 miles each way, making a 20-mile fence line, which was connected at Marlow with a 1-wire 2x4 post line, which had been hastily built from Marlow to Lawton, O. T., 30 miles distant.

The first piece of advice I shall offer is this: what you do, do with care and you will find that you have a convenient telephone line which will work with several 'phones on it, a distance of 20 miles during dry weather and, if very dry, you may ring 50 or more miles. Get only the best of telephones, about a 5-bar generator in what is known as the long distance bridging telephone. This will cost you complete about

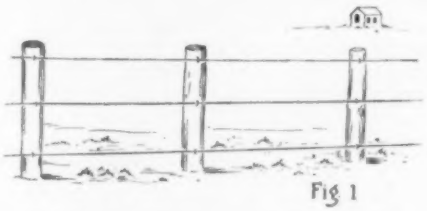


Fig 1

$12, and is well worth the price. Poor material gives poor results, so get the best of what you do buy.

Get permission from all who own the fences between you and the friend you desire to have telephonic communication with. This is generally an easy matter. If the wire fences are three wires or more, the instructions following will apply for all.

Get some poles or pieces of 2x4 about 16 feet long and saw across and downwards at one end of each piece so that a wire laid in the cleft so made, will not slip over the ends of the pole (a nail driven into the end of the pole and bent down across the wire, or

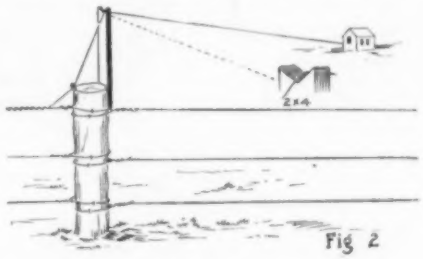


Fig 2

a fence nail will do better). Now get some No. 12 galvanized iron wire, enough to run across all gates, roads, culverts, or other obstacles, and to run from the fence to each house you desire to connect with.

Begin at the fence in front or near the first house and after splicing the barbed wire from each side of a certain post and tying the splice around the pole, put two good staples on each wire, then cut the original wires in center. Be sure to staple the wires before you cut the original wire, or they will all slip and make the fence sag and look bad. Staple the wires at least an inch from each other so that you have six separate ends on the post of a 3-wire fence. Fig. 1 shows the fence as it is before touching and Fig. 2 after the wires have been cut.

This operation leaves you with the wires in front of you to look after and saves your line from being bothered by grounds or other causes on parts of fence which are not used by you. Join an end of your iron galvanized wire to the top fence wire, pass it over the cleft in the end of one of the 2x4 pieces, or the end of one of the poles you may have. Fasten it there with a bent nail or staple, nail your pole, or 2x4 to the fence post and run the iron wire to the first house, fasten it on the side of the house and cut off the extra wire for further use. Return to the fence and carefully

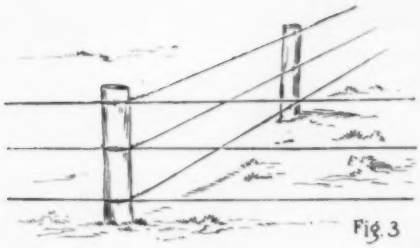


Fig. 3

follow it in direction of the next house you wish to connect with. See that all staples are in good, not only on the top wire (which will be the one used for the telephone line), but of all the wires, for you do not want any crossings, if possible, nor any sagging down and touching the ground by even the bottom wire, although you are not using it. The idea is to keep all the wires clear, for should they at any time become tangled with each other, it will not affect your line seriously unless the troublesome other wire should be grounded at some place.

Proceeding along the fence you will soon come to a cross fence. Fig. 3 shows how wires usually look on a fence where another joins it and Fig. 4 shows how you should fix all three of the cross fence wires so that they do not touch any of the three main-line fence wires. Be careful when separating them, to staple each wire well so that future visits for that purpose will not be necessary. Cut off all loose ends so farmers or small boys will not twist them around the wire you use. Next you may run across a wire gate, which many times is left lying on the ground. Fig. 5 shows such a gate and the way to pass it. Cut all wires loose at least one post from the gate on each side; two posts would be better, as much trouble often happens to 'phone lines at the gates. Two pieces of 2x4 are used here also as the drawing shows.

Fig. 6 shows how to cross a road, being similar to the manner of crossing over a gate. Observe that in every case all side fence wires or other obstructions are disconnected from the main line fence.

Fig. 7 is a hollow or creek fixed so that cattle cannot pass. The fence wires are usually tied to each other by smaller wires. These wires should be removed and replaced with a new strong wire and a small porcelain insulator between each fence wire so that while the fence wires are braced and held as before, they are insulated from each other. As such places are usually sources of annoyance, I would suggest the method of Fig. 8, although it is more trouble. This is the method used for crossing small rivers.

Fig. 9 shows a wire coming down a railroad right-of-way fence on one side, crossing under a culvert or bridge and going out on the other side. All three wires are disconnected on each side of the bridge or

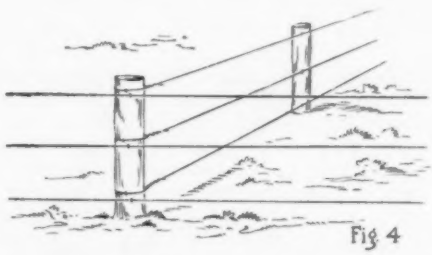


Fig. 4

culvert, similar to Fig. 2, and the connecting iron wire between the two sides of the culvert is run under and nailed to one of the cross-ties of the railroad track. If the ties are lying on the ground, a piece of heavy insulated wire nailed near the top, but on the side of a tie, will serve the purpose as well. In this latter case it is well to scoop out the sand next the tie so that in case of rain the water will drain quickly from each side of that particular cross-tie.

Fig. 10 is similar to Fig. 2, and is intended to show the end of the line. If, however, you desire to connect up several houses Fig. 11 shows how to do it. Each house is

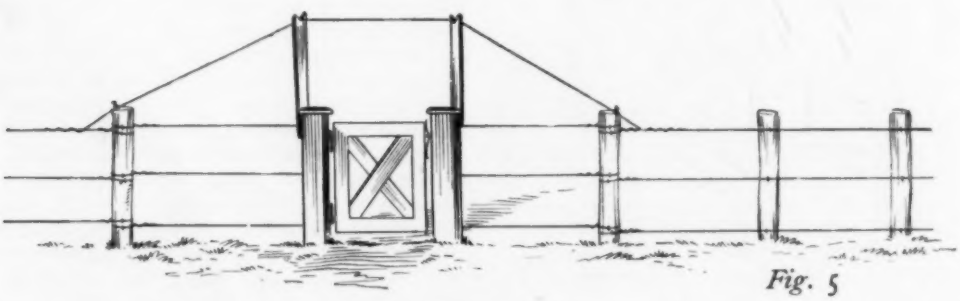


Fig. 5

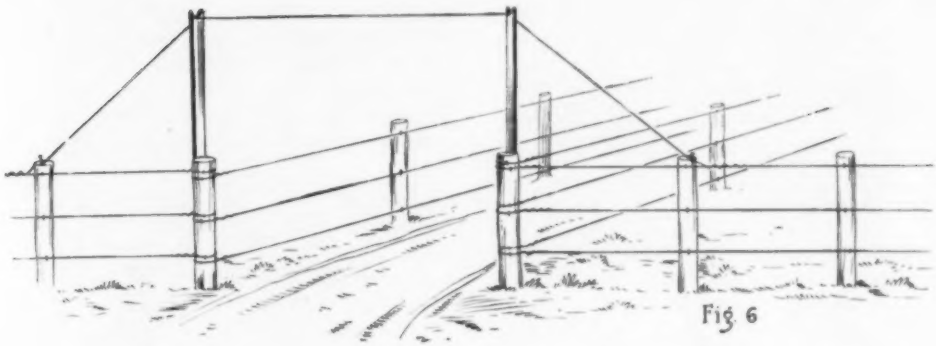


Fig. 6

approached and handled in the same manner as the first one, bridge 'phones being used with a ground wire at each house.

Fig. 12 shows how to place the telephone instrument inside the house, and Fig. 13 the fuse block and ground wire outside. After having attached your iron wire to the side of the house, bore a small hole through the wall (slanting upward from the outside so that wind and rain will not enter) bore another hole just above where you have decided to put the telephone instrument, and still another a few feet to one side of it. Get about 50 feet (to each house or 'phone) of No. 14 well covered insulated wire, copper preferred; take a knife and scrape away all the covering from one end of this wire for about two inches and run the scraped end through the hole at the top and just back of where you intend to put the telephone inside the room. Measure off enough of this wire to reach the ground and there scrape the covering for about six inches. Get a piece of iron rod about three feet long, an old wagon rod or stove rod will do, file each end of it bright for about six or eight inches, and wrap an extra piece of the copper wire around it (first removing the covering from the wire) many times, close and fast, soldering it if possible. Take your axe and, selecting a damp place at the bottom of the house, drive this rod down and under the house (where it is usually damp) until you have covered up the top of it, leaving sticking out the small wire you have wrapped it with. Now take some small double-headed tacks and neatly nail your wire from the 'phone, down the side of the house, along a crack where it will not show, to the grounded rod and there attach the two ends together. Cut another piece of wire about half the length of the wire already run to the 'phone, scrape each end well and join one end on the outside of the house to the wire already running to the ground. Run the other end through the next nearest hole and leave the slack inside

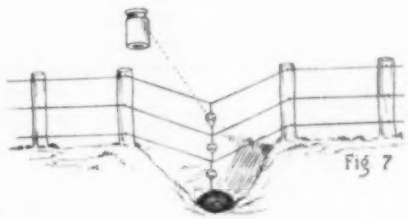


Fig. 7

the room until later. Now take your iron wire coming from the fence, fasten it up high where the cows will not break it down. Get a small fuse block and fuse from your local 'phone man, who will explain to you fully how to use it, and screw the fuse block to the house outside and well up under the eaves out of the rain. To the other end of the fuse block fasten another piece of insulated wire, well scraped, and run the end of this piece through the last hole you bored. Do not run two wires through the same hole and be careful to nail all wires down so the children will not be tempted to pull on them, thus breaking the line and giving you trouble. Now go inside and put up your telephone, with which directions are usually sent. Do not connect up the battery on your 'phone until after your instrument is up on the wall, for batteries run down or lose their

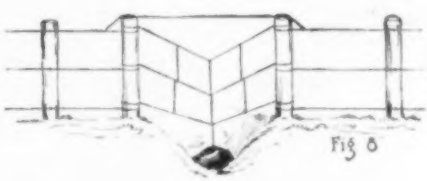


Fig. 8

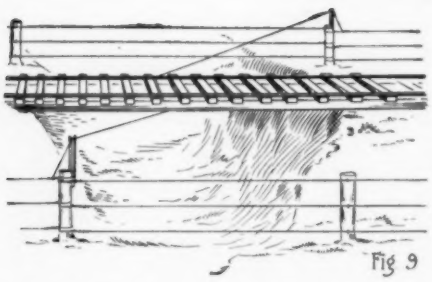


Fig 9

energy when in use constantly and a telephone on the wall is usually in a position where it throws the battery in circuit.

Get a small wooden 2-point switch with a little lever to it and fasten this switch to the wall immediately above and to one side of your telephone. There are small connecting posts under or on the lever and points, and to these posts attach wires as follows: to the lever itself attach a short wire and fasten the other end of it to one

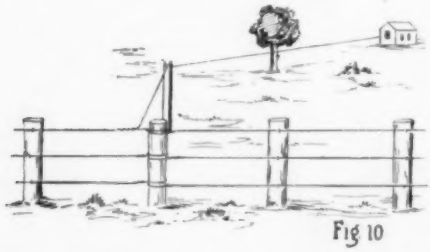


Fig 10

of the binding posts or screws at the top of the telephone; attach to one of the points, the wire which comes from the fuse block, and to the other point attach one of the wires that has been connected with the ground rod, now take the other wire, which also runs to the ground rod, and connect it to the remaining binding post at top of 'phone. Connect the battery in the battery box (put the small wire you will find there loose, under a binding post and screw it down). Now place the lever of your switch on the point the line wire comes to and see if you have left any loose ends of wires, for there should be none. Any

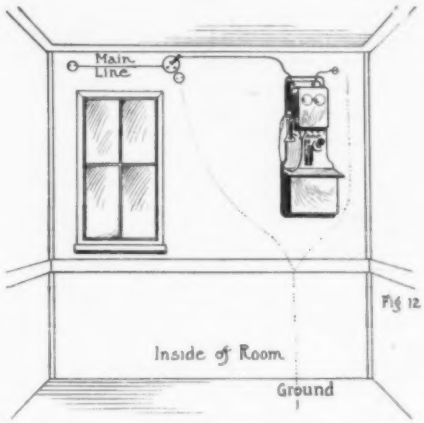


Fig 12

slack in wires may be remedied by winding the insulated wire around a wire nail or lead pencil. See that your fuse is well down in the block, that all screws and binding posts are well set, and, if such is the case, you are done here. Fix the next 'phone likewise and you are in readiness to ring your friend. The fuse block and fuse is for protection against lightning and the switch serves a similar purpose, and in addition is to be used to "test" your 'phone. If you find that you cannot ring, turn the switch to the other point and if it then rings, your 'phone is all right so far as ringing is concerned and the chances are that the line is cut somewhere. In case of lightning or a thunder storm you can turn the lever to the switch so that it touches no point at all. This leaves your line "open"

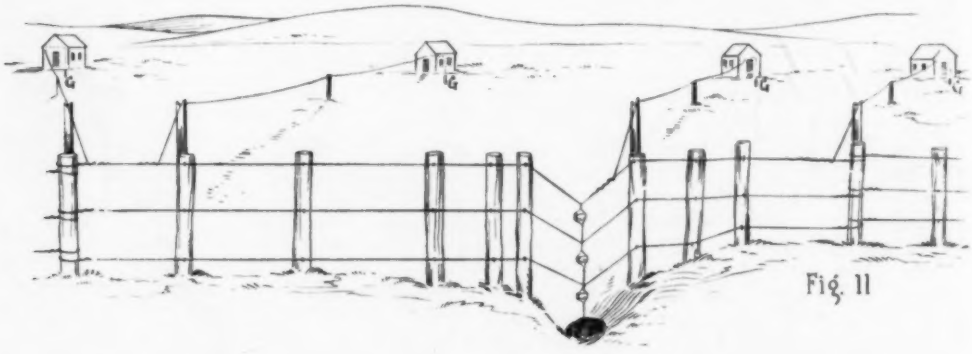
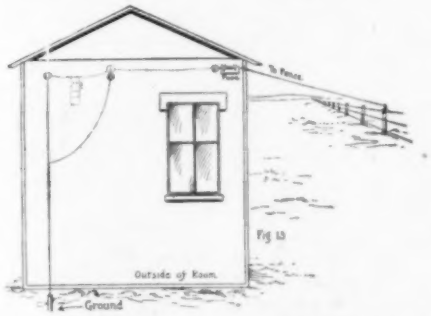


Fig. 11

and you cannot talk or ring anyone until you put the lever back on the point where the main line is connected. If, after putting



up both 'phones, the lines do not work, but test out properly so far as the instruments are concerned, the trouble is (and will be often if you do not follow to the letter directions given here) on the fence somewhere. Go over it again and when you see a place you are in doubt about, fix it. Then go back to your 'phone, leaving the other party at his and try again and you will doubtless have a pleasant surprise in the way of your first conversation over a barbed wire fence telephone line.

AFRICA IDEAL FOR COTTON GROWING.

England, in promoting the growth of cotton in Africa, has taken up a most promising field, as has Germany also. The climate, soil and native laborers of Africa are more favorable to cotton growing than they are in any other continent, and before 1905, in British Central Africa, alone, 200,000 acres of it will be planted.

British possessions in West Africa include 500,000 square miles, containing 20,000,000 negroes, and an output of 10,000,000 bales of cotton of superior quality per year is expected from that district.

That the market for the product is good is apparent from the fact that the average increase of the world's cotton output is 100,000 bales per year, while the average increase in population greatly exceeds it and cotton fabrics were never more in demand.

Egyptian cotton is noted for its silky softness, but in no other country save Africa has its seed produced good results. The establishment of transportation lines will make a great cotton territory of the Sudan as immigration to that part will be greatly increased.

FIRE ENGINE PROVIDES MUSIC FOR SCHOOL EXRCISES.

A fire engine returning from a fire provided the music for grammar school exercises that were being held in the First Presbyterian Church at Austin, Ill., recently. The big pipe organ at the church is pumped by a water motor, but owing to low water pressure the organ only gave a wheezing sound when the organist attempted to play. An alderman was in the audience, who went out and hailed a fire engine that chanced to be passing the church. By the aid of the fire engine and the blower the organ was pumped and the entertainment proceeded.

RAILWAY MOTOR SERVICE IN GERMANY.

Motor railroad cars for service on small local roads are now being built in Germany. The cars are to be of two sizes; the larger ones will pull a trailer of two tons gross and will accommodate the entire passenger, mail and freight service. Passenger service will be German third-class, the seats being unupholstered wooden ones. A separate compartment for passengers with heavy baggage will be provided or the space will be used for standing room in emergencies. These large cars, without the trailer, are capable of a speed of 46.6 miles.

The smaller cars will pull from three-quarters to one ton gross weight and will transport baggage and a limited number of passengers. The freight and regular parcels-post service will be handled by local trains. On main lines the small cars without trailer will have a speed of 37.3 miles, and on branch roads, 31 miles.

Besides these motor cars for railway service, street motor cars of five patterns for mail service are soon to be installed. Three of these are for use in inner cities while the other two types will be used on the highways in rural districts and will accommodate passengers, also smaller cars will be used to collect and deliver mail, and possibly freight, at points having no railroad connection.

Music to soothe the troubled minds of the insane is being used with great success at the Cook county asylum for the insane. One Chicago firm has recently donated six pianos to the institution.

WESTINGHOUSE CONDEMNS THE THIRD RAIL.

George Westinghouse, president of the Westinghouse Electric and Manufacturing company, says it is impossible to obviate the present dangers of the third rail and insists that there never was any good reason for the existing opposition to the overhead wire. The system of dividing the third rail into sections, with an automatic arrangement giving current to a particular section only when a train is using it, has been suggested as a protection, as has the covering of the rail with a hood. But these schemes, according to Mr. Westinghouse, can accomplish nothing more than a reduction of the danger. He advises that return be made to an overhead conductor which will obviate the danger entirely. Mr. Westinghouse says that the third rail is impossible for use at important junctions and terminals, that the Pennsylvania railroad does not intend to use it at all in its underground work between New Jersey and Long Island, that the Zossen high speed experiments were made with an overhead wire, and that the New York railroad commissioners have declared that they will not permit third rails on interurban lines which are crossed by highways.

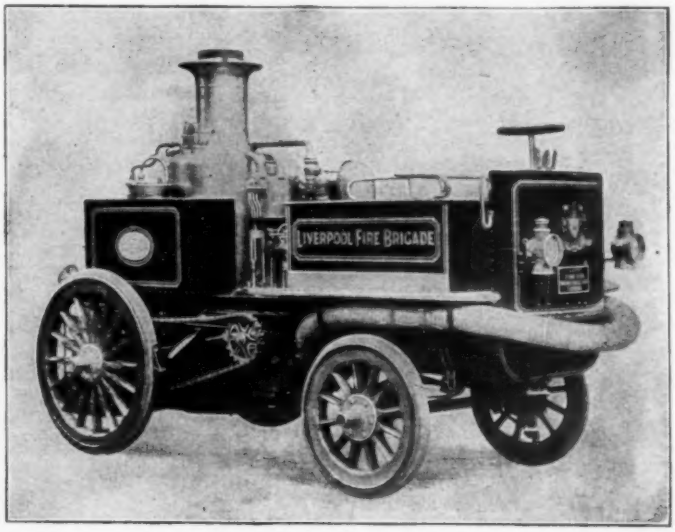
HOW TO MAKE OILED CLOTHING.

The great difficulty in making oiled clothing is to keep it from being sticky. To prevent the stickiness it should be artificially dried at 150 degrees Fahr. On a hot day the sun will dry it sufficiently. Set as much boiled oil as necessary and if for black work, mix in enough lampblack to blacken the clothing; if for yellow, use ground yellow ochre instead.

Lay the fabric on a smooth surface and apply the oil with a shoe brush. Let the first coat dry well before applying the second. A half pound of patent drier to each gallon of oil used will make it dry more quickly. Lay the oil on as thin as possible.

POWERFUL ENGLISH FIRE ENGINES ON EXHIBIT.

Notable among the many handsome exhibits shown at a fire prevention congress held at Earl's Court, England, recently, were an oil fuel motor steam fire engine and a "double vertical" steam expansion fire engine, each the finest of its type.



An Oil Fuel Motor Steam Fire Engine

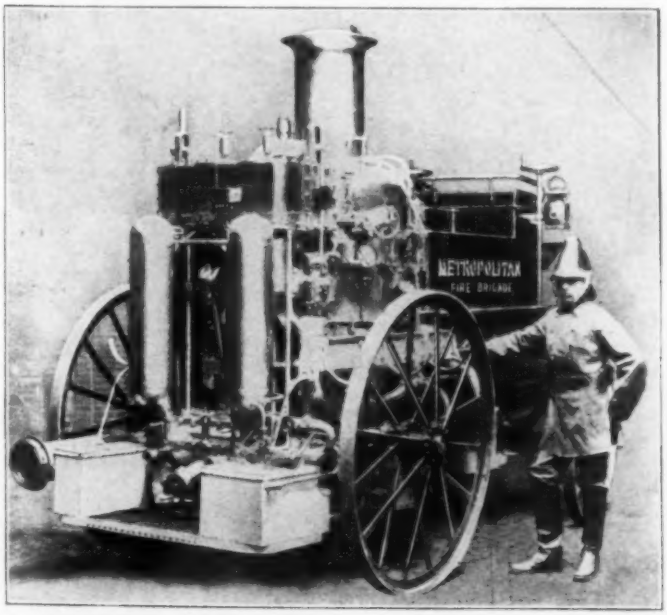
When standing in the station the oil fuel motor steam fire engine has about five pounds of steam in the boiler at all times, kept up by means of a gas jet. When a call is received vaporized oil is at once ignited, and inside a minute and a half the engine is out of the station and plunging away toward the fire. Its maximum speed is 30 miles an hour, and at all times its driver has it in complete control by means of the powerful brakes and steering gear with which it is equipped. Its pumping capacity is 320 gallons per minute, and in an instant the driving machinery can be thrown out of gear, the pumps put in, the hose being run out in the meantime, ready for use. The 36 gallons of oil carried in two cylinders are sufficient for several hours' work. On each side of the boiler is a storage tank for water and a main feed pump works while the engine is traveling; should this main feed give out, there is an injector handy.

For the "double vertical" variable expansion steam fire engine a quick-steaming boiler of the water-tube type, in which in

from five and one-half to seven minutes steam of 100 pounds pressure can be raised from cold water, furnishes the motive power. At the rear of this boiler are the steam cylinders and pumps placed vertically. The power of the engine can be regulated to the work to be done by variable steam expansion gear, which is an economical feature of the type. Oil fuel is used and 20 to 30 pounds of steam constantly maintained at the station. It carries a supply of oil for about 3 hours' action, and in working the oil is sprayed through several outlets on to a jet of highly superheated steam, which disperses it into fine molecules and forces it against a baffle-plate in the furnace. The furnace can be lighted while the engine is traveling toward the fire.

These "double vertical" engines are manufactured in seven sizes, the most powerful having a capacity of 1,000 gallons per minute. At the exhibit the power of this engine was demonstrated by throwing a stream from a 2⅛-inch nozzle a distance of 300 feet.

Another interesting exhibit was a portable engine having a capacity of 100 to 150 gallons per minute. This engine was especially designed for use on small estates and for institutions where it is desirable to have fire protection always available.



Powerful 1000-Gallon Steam Fire Engine

ASCRIBES SLOCUM HORROR TO AMERICAN GREED.

"Death Buoys," is the name given by the British Inventor to the life-saving apparatus of the "General Slocum." The British opinion is further expressed thus:

"To the American trader the sacredness of human life is a mere morbid sentiment which has no place in his composition, and if he can get in a deal he will make up some richly-painted and well-finished lifebelts filled with sawdust and sand regardless of the fact that this inhuman fraud may carry hundreds of victims to their deaths, as was the case in this last sacrifice to the rapacity and incapacity of those in authority."

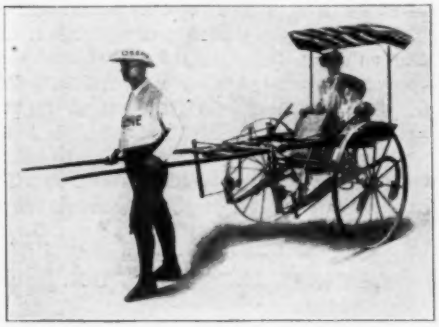
BROKEN LEGS CAN WALK.

Never more needs the man who breaks both his legs or fractures his thigh lie in bed for long weeks waiting for the broken bones to join and daily growing so stiff in the joints that when he is able to walk it will be a painful process. A German carpenter has invented a wonderful splint which enables the unfortunate with the broken bones to walk inside of three days after the accident, providing there are no complications.

Round the seat of the fracture is fastened a hardened leather case which fits the leg perfectly and the weight of the body is carried by jointed steel rods attached to another case fastened above or below the knee, according to the place of fracture. The London Hospital has used this appliance with excellent results. A man with a fractured thigh, admitted on February 2, walked across the ward on February 4 by means of the splint and was up every day thereafter. The tests by the hospitals are the best the invention could have.

THREE HUNDRED MILES ON A CULTIVATOR.

Of all the various means of transportation utilized to reach the St. Louis fair that of William Hoyt, of Moline, Ill., is thus far the most unique. He is connected with a manufacturing concern which makes farm implements, and he conceived the idea of walking the 300 miles from Moline to St. Louis, drawing the machine, with his wife and boy as passengers. The trip was made in safety and occupied three weeks.



En Route for the World's Fair

NEW MAMMOTH FREIGHT LOCOMOTIVE.

Towering 20 feet high, this great mass of steel and iron weighing 118 tons instantly attracts attention from all who witness its almost irresistible progress. In its tender is sufficient coal to last two families all winter, while its supply of water would fill a good sized swimming pond.

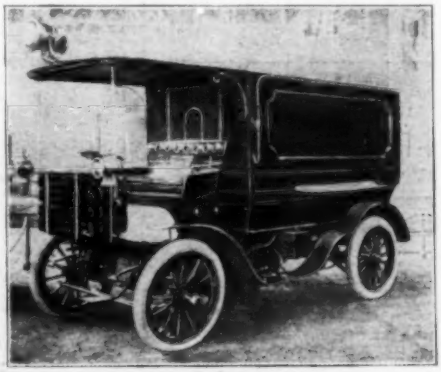
Within the past few months the Lake Shore Railroad has been installing some mammoth locomotives of the consolidation type for use in the heavy traffic of iron ore between the lake port of Ashtabula, O., and the furnace districts of Pittsburg. Since their introduction some excellent records for tonnage have been made. During the early part of July trains of ore weighing, exclusive of the locomotive, 3,500 tons have been sent south from Ashtabula. After leaving the steep grade at a point near Ashtabula one locomotive hauled these trains via the new low grade ore-carrying line upon which the Lake Shore expended hundreds of thousands of dollars in building. Previous to the record made in July the best former record since the introduction of the mammoth new engines was a tonnage of about 3,000 tons. The latest record will be improved upon, it is expected, in the near future.

The weight of the new locomotive is 235,000 pounds. This is said to be 35 per cent heavier than any freight locomotive yet used by the Lake Shore. The weight upon the drivers is 200,000 pounds. The tank capacity is 7,500 gallons and the coal capacity 16 tons. The boiler is built for a steam pressure of 200 pounds. The drivers of this big locomotive are 57 inches in diameter. The wheel base of the engine and tender is 58 feet.

AN AUTOMOBILE POLICE PATROL FOR CITY WORK.

When automobile police patrols come into use more generally the number of miscreants who suffer violence at the hands of mobs will be materially lessened. The fact that the automobile is dependent not on horseflesh, which is liable to give out, but on mechanism which is certain and can also attain a speed which would strike terror to the hearts of the average mob are two great elements in its favor.

One of the foreign exhibits at the St Louis Exposition is an automobile designed for either police patrol work in cities or for a money or securities transport for banks and trust companies. The vehicle is very strong and has a powerful searchlight on the roof in front.



The Most Modern Patrol.

The leading cheese-makers of Wisconsin now dip the cheese after coming from the press, in hot parafine. This makes a coating impervious to air or moisture, hence a cheese so treated will keep longer and better.

An Automobile at High Speed

An Instantaneous Photograph of Théry, the Winner in the International Gordon-Bennett Contest, Going at the Rate of 80 Miles an Hour. Exposure 1-1000 of a Second

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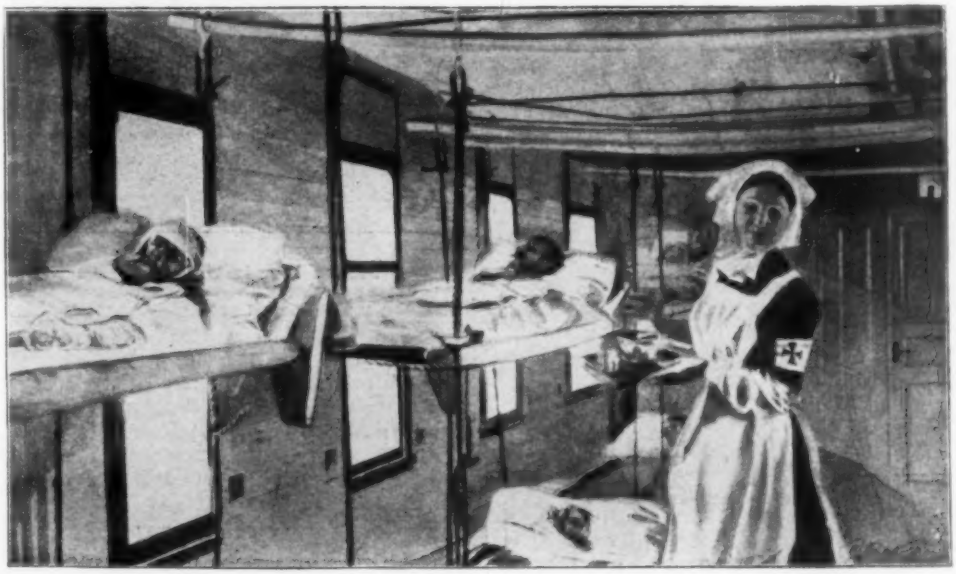
In the Russian Hospital Train at Mukden



The Red Cross Work is a Redeeming Feature of the War. To these Ministrant Spirits the Sick and Wounded of Both Sides will owe a Gigantic Debt of Gratitude. The Illustration Shows the Bare but Sanitary Interior of a Russian Hospital Train.

Royal Automobile for Emperor of China

The Emperor of China has joined the ranks of motor car enthusiasts, and has had built in France a royal car at a cost of $10,000. At first thought there seems nothing unusual in an Emperor having an automobile. But this Emperor is at the head

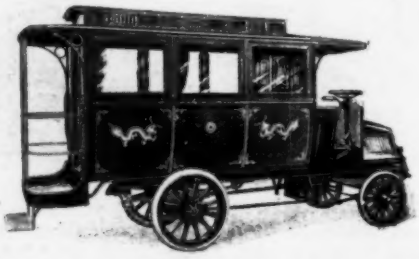
Interior of Chinese Emperor's Automobile

of the great Chinese Kingdom, and therein lies the wonder.

To appreciate the tremendous advance in western ideas by the ruler of the Orient, we need only to recall the stubborn resistance which for centuries, was waged against any of the barbarisms of civilization.

When the English laid the first railway in China there was great alarm among the natives who feared some evil spell, and when the first train went puffing and snorting over the new line there was general consternation on all sides. It is said the English locomotive engineers did not hesitate to make free use of their whistles, which were the special objects of terror.

And now the Emperor not only is to own an automobile but will go out to ride in one. Surely the world does move when the ruling fad in Europe and America receives Oriental recognition and patronage.



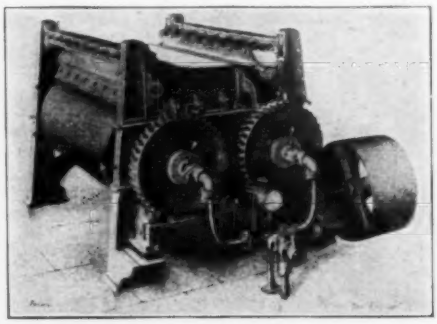
The Chinese Emperor's Automobile

The royal auto differs not so much from other motor vehicles, although it is handsomely furnished within and bears the royal insignia without. The Emperor is exclusive, however, and will ride alone, seated in a revolving chair. Guards will be stationed at front and rear to prevent any frisky little pig tails from "hitching on" and thus committing an act of lèse-majesté.

To the practical, every-day American, the royal auto carriage will appear very much as an ordinary good bus, such as he rides in to depots.

MACHINE FOR DRYING MILK.

A machine which dries milk and then grinds it into a fine white flour or powder is being used in England. The process is really very simple, consisting of two hollow cylinders heated by steam to a surface temperature of 230 degrees F., over which the milk passes. The cylinders turn in opposite directions. These cylinders are ⅛ inch apart



Milk Drying Machine

and the milk flows continuously upon them. The liquid portion is dried out leaving a dry substance like a sheet of paper adhering to each roll. A scraping knife is placed at the top which removes the product, leaving the cylinder clean to receive more milk. Only 30 seconds are required to convert milk by the quart into milk flour by the pound.

In some roundhouses pianos are used to test the engines. A pianist strikes the note with which the noise of vibration made by the locomotive part being tested should accord. A discord on the locomotive's part means a flaw.

TROOPS BY TROLLEY.

In a country so large as ours, and in which the transportation lines are increasing so rapidly, constant vigilance is necessary at the War Department to keep posted on what facilities are really available.

"In a time of peace these precautions have only a secondary interest and value," says the Street Railway Journal, "but in time of war they are immediately necessary and there is no time in which to obtain them." It is urged that a complete knowledge of the transportation facilities now available on thousands of miles of interurban trolley lines should be mapped and recorded and the data made ready for use on a moment's notice. The same editorial further says: "In the Spanish war the transportation was a national disgrace. All accusations of pull and graft aside, it was the most stupidly organized and incompetently carried out attempt at mobilization that modern times has seen. The lack of full and exact knowledge of the railway facilities was at the bottom of the trouble. Some officer should have been able to drop in upon the manager of each railroad used with accurate previous knowledge of its entire capabilities upon which to base his plans. And for rapid concentration of troops this information must be extended to cover the electric roads as well as the steam roads. If it should be desirable to hurl a brigade suddenly upon some point upon the coast, some one should know not only what facilities can be secured to the nearest railroad station, but whether electric roads are available thence to the destination; how many cars can be concentrated at the given point ready for use, at what rate they can be dispatched without crippling the motive power, and at what speed the run can be made. If a dozen miles is to be covered it may make a vital difference in the result if electrics can be used. In a country well covered by electric roads infantry can be given almost the mobility of cavalry, if the roads can be utilized at short notice; but practical usefulness depends upon good previous knowledge of their exact capabilities."

The Dead Sea has 26 per cent of solids consisting principally of chlorides of sodium, magnesium and calcium. Its greatest depth (1,310 feet) is 2,600 feet below sea level. The sea has its own cloud system, and its clouds frequently hang six or seven hundred feet below the ocean.

Emperor William

The Kaiser on a Warship at Kiel, "the Cradle of the German Navy"

A Good Method For Printing Postcards

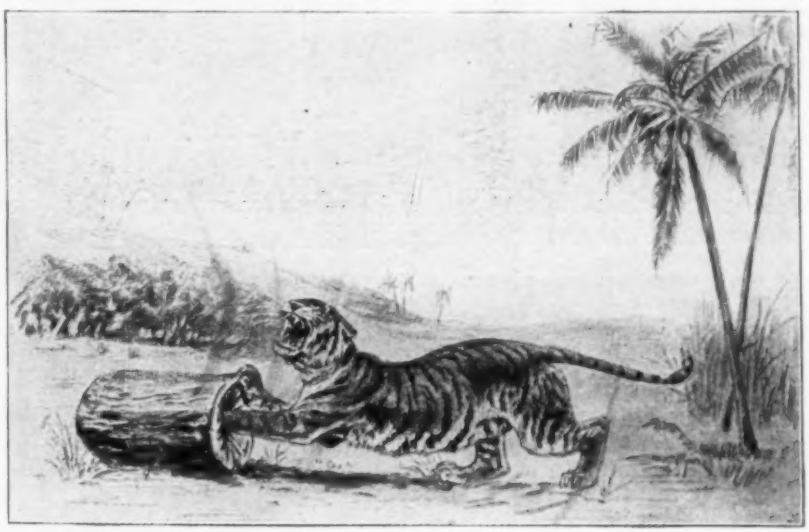
For printing postcards, which any photographer can make a profitable side line, the collotype method is the best, for by it hundreds of beautiful prints can be made cheaper than tens by any other process, and the method is very simple.

An expensive press for this work is not necessary. An ordinary letter-copying press will do very good work, several patterns of printing-presses may be readily adapted, while an excellent collotype press, taking a 10x7¼, may be obtained for about $35. The drying oven for the plates, although a great advantage, is not absolutely indispensable; a very good substitute may be quickly made with a suitably perforated wooden box, provided with a metal shelf for the sand-bath, properly leveled ledges for the plates, and a couple of long atmospheric gas burners connected with a rubber tube for heating. The box is open at the top, and covered during use with a canvas lid to allow of free ventilation. The preparation of the glass plates presents little difficulty to a careful worker. Glasses of suitable size are obtainable of any dealer in photo-mechanical goods. It is advisable at first to buy them ready ground; when a little experience has been gained they may be ground as wanted by placing the finest emery powder between the glasses, well wetting with water, and rubbing them over each other till both are sufficiently ground; they are then well washed and dried. Before they can be sensitized apply to the glass the following solution: Albumen, 5 ounces; potassium silicate, 2 ounces; water, 5 ounces. This should be well mixed and filtered, and poured over the plate in much the same way as a varnish. The plate is then placed in a rack to dry; when dry it is rinsed under the tap and again dried. A suitable formula for sensitizing is Creutz middle hard gelatine, 1 ounce; potassium bichromate, 50 grains; ammonia bichromate, 50 grains; chrome alum, 1 grain; water, 10 ounces. The water is divided into two portions, the gelatine being placed in one and the bichromates and chrome alum in the other. As soon as the gelatine has absorbed the water it is melted by a gentle heat and the bichromate solution added gradually, stirring well. The solution is then filtered through swansdown, calico, or wash-leather before it has time to get cool. For this purpose a filter pump or similar device is very useful. When filtered the solution is ready for application to the plates, which should be first warmed. The liquid is poured on similarly to a varnish, helping it where desirable with a clean glass rod. It is now placed to dry on a perfectly level shelf or slab in the drying oven for about two hours, the most suitable temperature being about 120 degrees Fahr. Draughts and vibration should be carefully avoided during the drying. The plates should dry evenly, absolutely free from streaks, and with a dull matt surface. They are then ready for exposure. A printing frame with wedges or screws is preferable, but for postcard work not absolutely necessary so long as close pressure and contact can be insured. The most suitable negative is one that is soft, with ample gradation and detail; hard negatives are quite useless if the best results are desired. The edges of the negative are masked by gumming on narrow strips of tinfoil to the desired shape. Printing is judged by looking at the back of the plate; a faint brown image is visible, and detail should be perceptible in the high lights. Those who prefer it may work with an actinometer after one or two preliminary experiments. Development is effected by washing with cold water until the bichromate is completely removed; this will take about an hour and a half to two hours. The image will be invisible, but will perhaps show a slight amount of relief. The plate is then stood up to dry. Before it can be printed from it must be treated with what is known as "the etch," a solution intended to be thoroughly damp and keep it in a moist condition. A good formula for this is water, 10 ounces; glycerine, 15 ounces; sodium chloride, 25 grains. The plate is leveled and the solution poured over, allowing it to remain for from a quarter of an hour to three hours, according to the hardness or softness of the plate, a factor which naturally depends on the exposure given. An over-exposed plate will need to remain longer under the solution than a normally exposed one. It is better to give, say, half an hour first, then to wipe off the solution with a sponge, and gently dry the plate with a clean rag. The plate can now be placed in the press, inked, and an impression pulled, when, if unsatisfactory, the ink may be removed with turpentine and a further etch given.

An ink slab, a small quantity of thick collotype ink, a fine nap roller, and a composition or gelatine roller are now required. For the ink slab an old lithographic stone may be used, on which the thick ink is to be worked up with a little collotype varnish and a palette knife. The ink should be used as stiff as possible, and is applied to the plate with a nap roller, a fair amount of pressure being used and the work being done rather slowly until the plate appears black all over. The latter is now rolled with the composition roller, more rapidly and with less pressure. This will clean the picture up a good deal, and several proofs can now be taken, when it will be seen whether the plate requires re-etching or other treatment. The margins may be cleaned, if necessary, with a strong solution of hypo or by masking the edges with strips of oiled paper. Care must be taken that the plate is well cleaned at the back before placing in the press, as the slightest grit or inequality will cause it to crack under pressure. It must be accurately leveled, and laid on about half a dozen sheets of thick blotting-paper as a bedding, after which proceed with the printing.

There are, it should be mentioned, one or two even simpler modifications of collotype, in which the necessity for a glass plate is done away with; these are peculiarly adapted for postcard work, where very large numbers of prints from one negative are not desired. The photographic worker who makes a chronic complaint of "bad business" is strongly urged to make a trial of the many possibilities of collotype, not only for postcard work, but for the numerous other purposes which will readily suggest themselves, not the least of which is the rapid completion of orders in dull weather, when one is often at a loss for useful and profitable occupation.

How the Chinese Catch Tigers

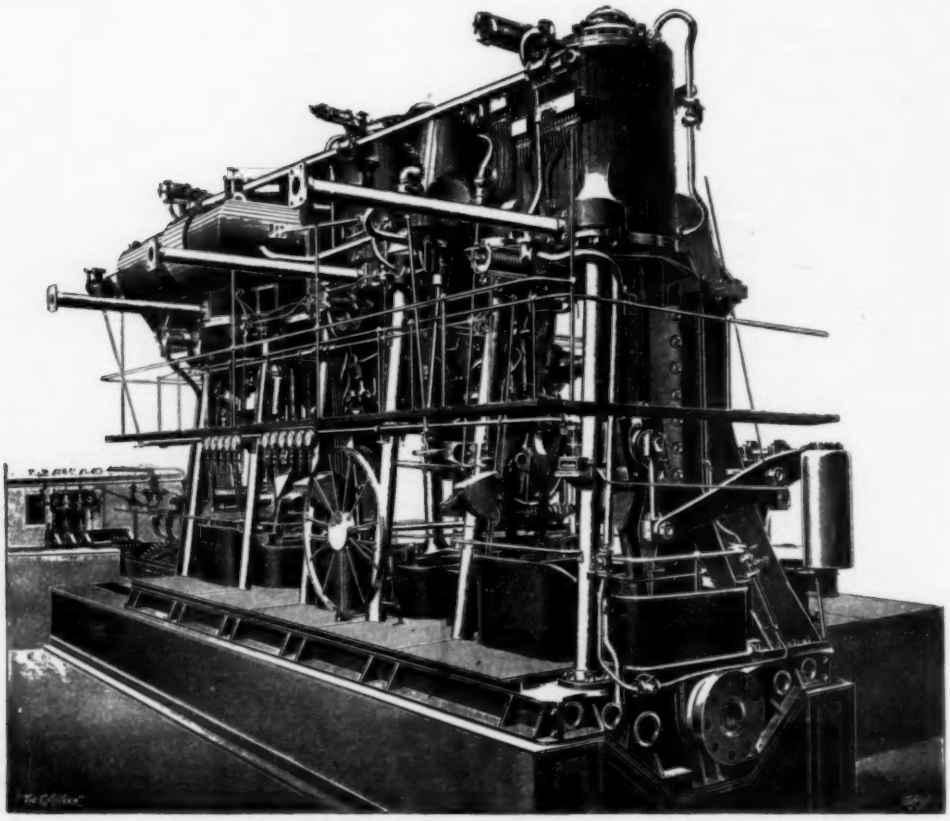


An Ingenious Method of Trapping Tigers

The natives of a wild and isolated part of Cochin China construct an ingenious trap for catching tigers and large black panthers which abound in the district. A short length of a tree log is hollowed out and around each end of it are driven long, sharp spikes, so as to project inwards, leaving an opening of about six inches. Through a small trap door a pariah dog or a pig is then placed in the log for bait and the trap left for future developments.

The tiger or panther easily pushes in his paw to secure the bait, but when he tries to withdraw it, it is impaled on the sharp spikes and he is trapped. Not infrequently tigers carry off natives or stock, though all the villages are surrounded by strong palisades.

Powerful Marine Engines



7,500-I. H. P. Triple-Expansion Engines in H. M. S. "Prince of Wales"

The new first-class battleship H. M. S. "Prince of Wales," is driven by a pair of engines aggregating 15,000 horsepower. Each unit is 7,500 horsepower and contained in a separate watertight compartment. There are really three engines in each of the two sets, working together as triple-expansion, by means of which the same steam is used three times. From the boilers the steam enters the first or high pressure cylinder (diameter 31½ inches) at 250 pounds pressure; thence it passes to the intermediate pressure cylinder (diameter 51½ inches); and then to the low pressure cylinder (diameter 84 inches.) The steam is then exhausted into condensers with a total cooling surface of 16,000 square feet.

The illustration shows one of the triple expansion sets. Twenty large boilers are required to make steam for these engines, and afford a heating surface of 37,640 square feet. The grate surface in which the fuel is burned has an area of 1,170 square feet. A better conception of this roaring, furious mass of flame is to think of it as 117 feet long and 10 feet wide.

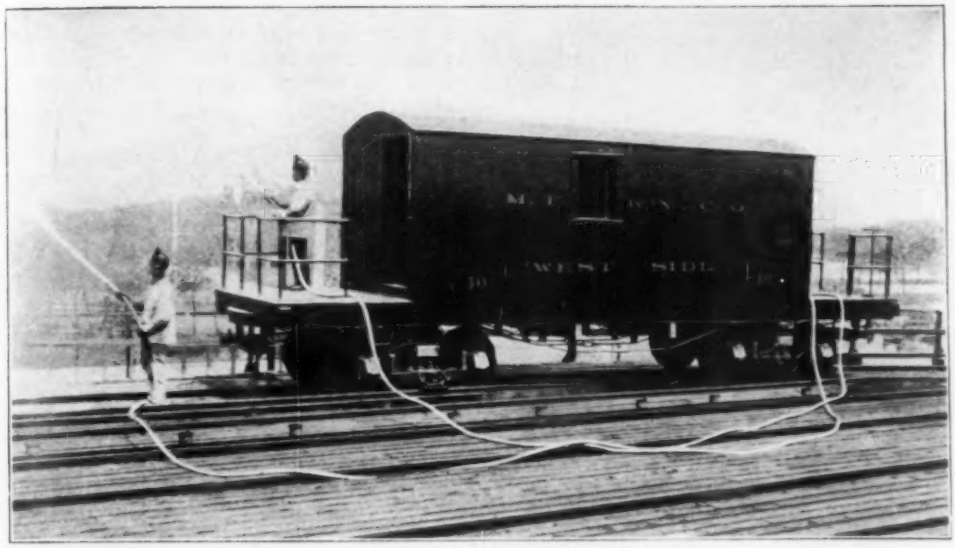
The engines were built in England, and at the recent test went considerably in excess of their indicated power.

London bridge has recently been widened from 53 feet 5 inches to 65 feet, at a cost of $3,500 per running inch. This makes the roadway over the bridge 35 feet wide and the foot walks on either side 15 feet wide.

The Wabash river is one of the best pearling streams in the United States. One man who engaged in pearl hunting last year secured $5,000 worth of pearls, the finest being worth $80. The hunting is done when the river is low.

Fire Engines in The Air

How An Elevated Railway Fights Its Fires



Fire Engine Car for Elevated Road

Fighting fires at terminals of elevated roads occasions great difficulty for the firemen, not only because the structure is a good many feet above the surface of the earth, but the particular part or car where the blaze has originated may be in the center of the yard, surrounded by many cars and, worse by far, by a maze of highly charged rails, to come in contact with which would be dangerous, not to say fatal. Under these conditions the problem of leading the hose to the right location is a troublesome one.

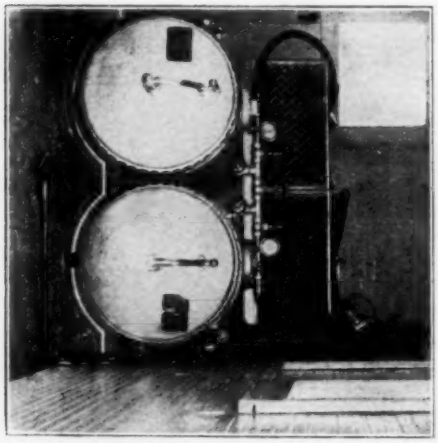
The Metropolitan Elevated Railway Company of Chicago has recently installed a new fire car for the protection of its four yards and terminals where it has many cars stored. The fire car is 8 feet wide and 30 feet long on the outside, including a 5-foot platform at each end. The house of the car is 20 feet long, has two windows and two doors, and is completely covered with corrugated iron. The platforms are of ¼-inch steel plate.

The fire extinguisher system consists of two duplicate horizontal pressure tanks mounted side by side on the floor, leaving a 3-foot passage at one side of them. A shaft runs through the center of each tank and each shaft carries two paddles and terminates on the outside of the tank, one end of each having a crank. In the top of each tank near the crank is a large hole closed by a cap which screws down closely, and inside the tank under the hole the shaft and paddles are bent so as to form a cradle. Water and soda are put in through the holes, mixed by a few turns of the paddles and then the acid jar is set in the cradle and the shaft rotated, spilling out the acid and agitating the whole mixture so that the pressure is maintained. A hose basket on top of each tank holds 150 feet of 1-inch hose, coupled at one end to the piping out of the pressure tanks and having at the other end a ½-inch brass nozzle with a shut-off valve. Either hose or both hose together can be played from either tank and a 250-pound pressure gage is mounted on each hose near its controlling valve.

An upright water supply tank of 250 gallons capacity stands in the opposite corner of the car, at a height which allows the water to gravitate to the pressure tanks. Under the water tank is a cupboard for storing charges of soda, etc.

To put the apparatus into action all that is necessary is to lead out the hose, turn the crank a few times and open the proper valves. One tank is discharged at a time

and is refilled while the next one is being used. One tank, supplying both hose lines at 150 pounds pressure, will run 7 minutes, and it takes but 4 minutes to recharge it.



The Chemical Tanks

The car has no motor but is so located at the yard that any motor can move it. The company are building three more of these cars so that there will be one at each of its terminals.

Aluminum bobbins are to be used in the textile industries hereafter, instead of wooden ones. Wooden bobbins suffer from variations of temperature and at times revolve so irregularly that they cause the thread to break. Aluminum bobbins revolve in any temperature and at a greater speed than the wooden ones and are also much lighter.

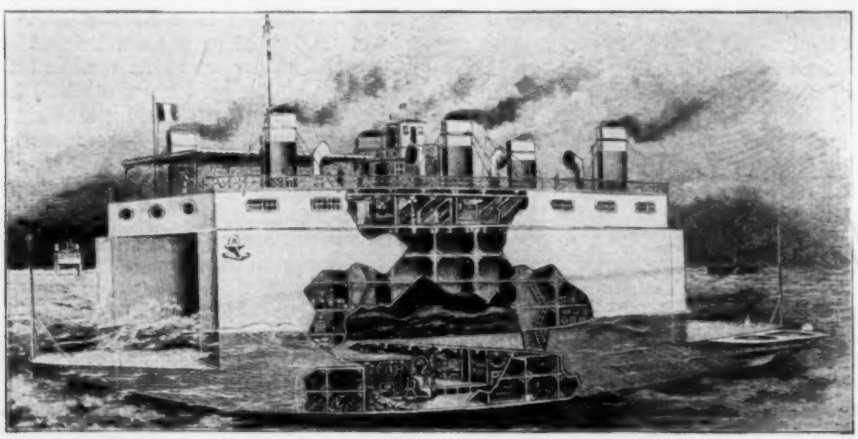
RIDES ROUGH SEAS IN COMFORT.

Strange Craft for Use in the English Channel

French shipbuilders are determined to produce a craft which shall sail the turbulent waters of the English channel in peace and comfort. This water gap between England and France is the pathway of a constant train of passenger vessels which are tossed about unmercifully by the conflicting powers of currents, tides and winds; when all three combine, even the bravest sailor would rather be on shore.

A few years ago the French built a vessel in which the upper works rested on two hulls like a great catamaran. It failed, however, as the center of gravity was too high. Another effort is being made in which the hull is submerged and the upper works rest on two longitudinal sides, permitting a free wash of the sea through the aperture thus created. All the fuel, boilers and engines are in the hold, and water ballast tanks further serve to hold the vessel down in the water. The cabins and staterooms, which are comparatively light, are all at the top. The entire structure is of steel, with heavy skeleton framing like a modern skyscraper. Four batteries of boilers furnish steam to the 16,000-horsepower engines which will propel the boat at a speed of 19 knots per hour. It is expected the most sensitive person will be able to make the crossing without any suggestion of sea-sickness.

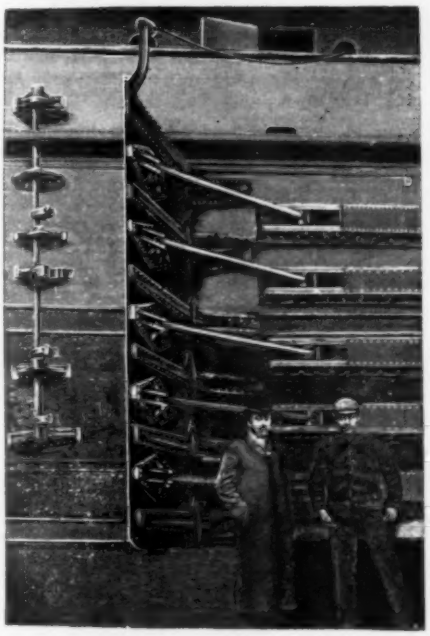
The construction of whaleback vessels overcomes the rolling and pitching somewhat, but there is room for much improvement in this line.



Ship to Sail Smoothly in Rough Water

BRAKES TO STOP SHIPS.

A brake for ships has been invented which greatly assists in overcoming the momentum of the vessel. The present method of stopping a boat is by reversing the engines and propellers. This takes time, and in the case of a large craft, it must



Huge Brake for Stopping Ships.

proceed a considerable distance before the retarding influence begins to take effect. While this time is being lost a collision may have occurred.

The ship's brake is a strong steel plate, in size proportionate to that of the vessel, which, when released, unfolds from the hull and assumes a position at a right angle. Strong steel arms hold it in position. When not in use the brake folds up close to the hull and is held in place by a set of dogs acting as clamps. With a number of these brakes on each side of the hull, and placed of course, below the water line, the effect is felt at once when they are released. The brakes are all controlled from the pilot house and bridge where the movement of a single lever instantly puts them all in action.

During a recent trial made in the St. Lawrence river, near Montreal, a steamer was driven ahead at an indicated speed of eleven knots an hour. Steam was then shut off, and simultaneously the brake on each side opened. The vessel came to a full stop within a distance equal to her own length. The brakes were then closed, the vessel sent ahead until the original rate of speed was attained, when the engines were reversed and the brakes opened, with the result that all headway ceased after she had gone but 50 feet—about half her length. In maneuvering the "Eureka" at full speed she was turned also within her own length, with one brake thrown open. An examination of the hull and brake mechanism after the tests showed apparently no harmful strain or other damage, and in operating the brake, no jar or vibration was observable by those on board.

SMOKE RESPIRATORS FOR FIREMEN.

Smoke respirators are now used by many fire brigades in all countries. With the spray of water falling around his head the fireman's eyes, nostrils and mouth are well

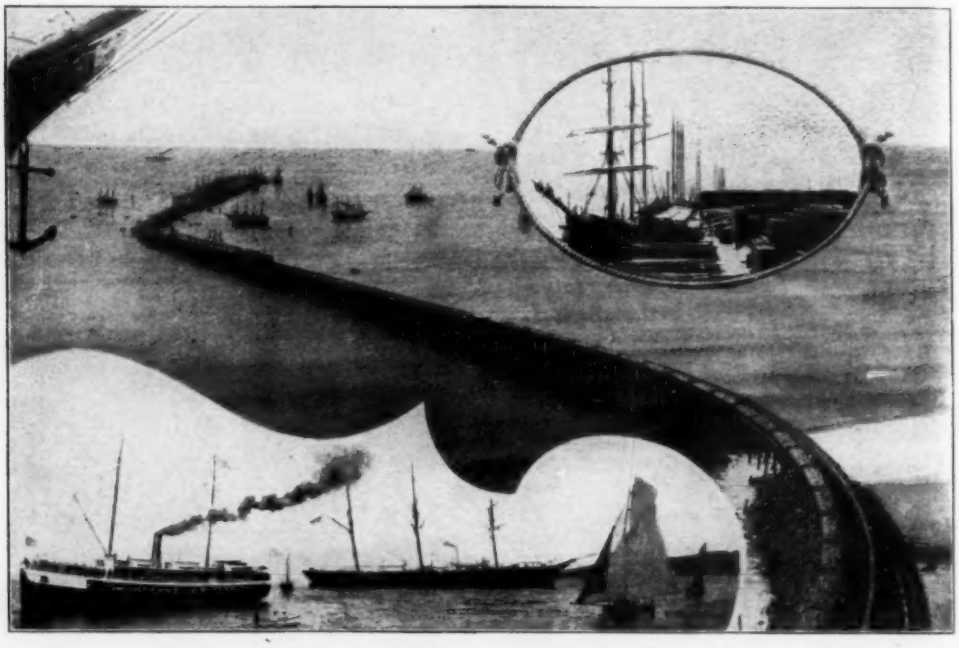
Smoke Respirator in Use

protected from the heat, and he can remain a long while in rooms and other places highly charged with smoke, fighting the fire and saving much valuable property.

"Telagirl" is the newest use for the telephone. It is simply dictating to a stenographer over a telephone. The stenographer then typewrites the matter and it is then sent to the office of the dictator.

LONGEST WHARF IN THE UNITED STATES.

What is without doubt the longest ocean-wharf in the United States, if not in the world, is in the state of California. This great railway dock is located at Port Los Angeles, which runs out into the sea from the mouth of the Canyon two miles north of Santa Monica, California. The structure is over 4,700 feet long, and the claim is made that it is the longest wharf in the world. It is built on wooden piles, set in rows 12 feet apart. The piles are of fir and pine, and 5,000 trees were cut down to secure the material. The structure cost $500,000. A double track extends the entire length with switch tracks at the sea end where vessels from all parts of the world transfer freight to the steam roads. The outer portion of the pier is supported on concrete piling, and includes offices, shops, coaling bunkers, etc. The freight and passenger traffic handled is very large.



Ocean Wharf 4,700 Feet Long

The laundry bill of a line having nine passenger steamers amounts to $20,000 a year. A stock of 25,000 pieces of washable goods is required and the work of examining and repairing it at regular intervals costs about $6,000.

DEVICE PREVENTS OIL OR GASOLINE EXPLOSIONS.

The "Nonex" is a new device which under severe tests prevented the explosion of gasoline, reports U. S. Consul Halstead, of Birmingham, England.

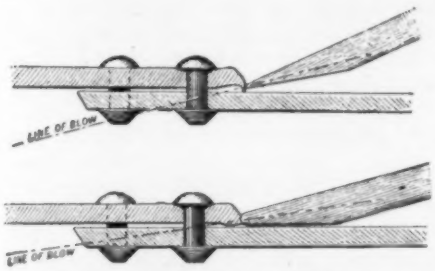
The device consists of a tube made of layers of metal, each layer perforated to allow the liquid to be poured out when desired. The tube is fastened to the opening of the tank or vessel and projects inward to the bottom where it is closed. When the tank containing the liquid is exposed to heat or directly to flames the solder holding the fusible screw cap melts, leaving the perforated tube open. The gas percolating through the tube burns, but no explosion follows, nor does the oil in the tank catch fire for the metal layers of the tube absorb the heat which otherwise would expand the liquid and cause an explosion.

A 20-gallon tank partly filled with gasoline and fitted with a tube was placed on a lighted bonfire and did not explode. The fire inside the tube was easily extinguished. The weak point is how hot can the tube become without expanding the gasoline? The inventors have never made a test long enough to show this.

SHOP NOTES

CAULKING BOILERS.

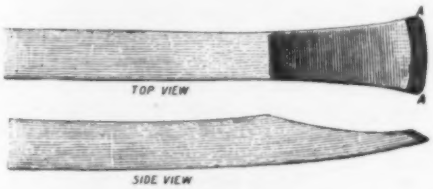
Caulking a steam boiler is something which requires more skill and experience than many engineers and mechanics realize. A correspondent in the Blacksmith and Wheelwright contributes the following comments:



First method, improper; second method, good.

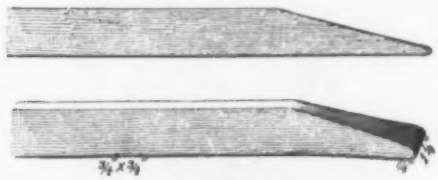
I worked for an iron ship-building concern employing three thousand men, and saw most kinds of work done, though not perhaps working at it.

In first-class boiler work the edges of the sheets are all planed slightly beveling, as it makes a better joint to caulk; too much lap outside the line of rivet holes being as bad as too little. I fancy the allowance is 1½ diameter of rivet, but forget whether taken from center hole or outside edge—nothing is used between edges. If the edge of the plate is not planed or is rough, it has to be chipped and great care has to be



Caulking Tool.

taken that in doing so a line is not cut along the joint on the other plate, weakening it and inducing grooving. Many cases of explosions have been traced to this cause, the rip having followed the caulking line instead of the rivet line. What has to be aimed at to make good work is expanding or upsetting the plate enough to make a tight joint, such upsetting to go some distance down, not merely a little burr. To do this you want a round-nosed tool, held well upright, held hard to its work and struck with not too light a hammer, and the chisel not so long it takes up the blow; leave no gaps—marry your work as you go. Avoid using too thin a pointed chisel, which is



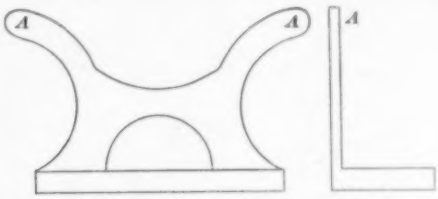
Caulking Chisel.

likely to open up a strained seam or at best only to force off the top edge and make a burr and rust joint.

This is not to be taken as favoring heavy caulking, which is as bad as drifting holes, but let us use what brains we have. Well done is twice done, and men's lives are back of our work and we are responsible for them.

VISE JAWS CAST FROM SOFT BRASS.

Many big machine shops use vise jaws cast, as here shown, from soft brass. A is

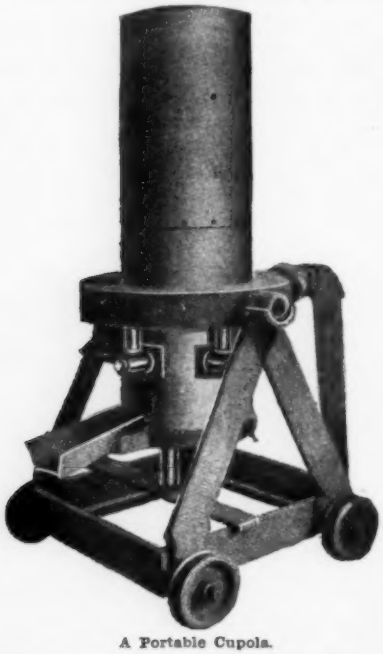


formed over the top to keep from falling off.

Those of our readers who are specially interested in this department are invited to send in new ideas and "kinks", which are likely to be of interest and help to others.

HOW TO MAKE A PORTABLE CUPOLA.

All foundries have to produce castings in a hurry at times, and sometimes it is inconvenient to wait for iron from the regular cupola or to fire up one of the large cupolas for a small quantity of metal, says Foundry.



A Portable Cupola.

A small portable cupola, such as that shown in the accompanying illustration, will be found very serviceable indeed for such occasions as this. The cupola shown is in use in Paducah, Ky. It has no stack and is set against one wall of the foundry. Air for the blast comes from the blacksmith shop, which is about 20 feet away, the air being conducted through a pipe underground and brought up behind the cupola, as shown. Connection is made with the cupola by means of a gland, as shown in the illustration. The diameter of the shell is 18 inches and the height of the shell 5 feet. All of the castings for the cupola were made in open sand, and the construction was such that very little patternmaking was required.

The bussel pipe is a ring of square cross section, about 5 inches on a side. The tuyeres are made from 1½-inch pipe. The cupola is mounted upon a frame upon wheels, as shown, so that it can be moved away from the wall for cleaning and repairs. The A-shaped frame which supports the trunnion is 3 feet high, the center of the trunnion about 3 feet 6 inches from the floor.

When in use the cupola is lined with molding sand ¾ of an inch thick. A casting weighing 300 pounds can be made with this cupola, and a heat of 700 pounds of metal can be taken from it. The charges for such a heat are as follows: Three riddles of coke for the bed and 300 pounds of iron. This is followed by two charges composed of one riddle full of coke and 150 pounds of iron each, and one charge of one riddle of coke and 100 pounds of iron.

The cupola can be gotten ready and hot iron available in from an hour to an hour and a half at any time. When large brass castings are required, the cupola is simply relined and from 300 to 400 pounds of brass melted in it without any difficulty.

DETERIORATION IN GRATES.

The principal cause which contributes to the rapid burning out of the grate bars in a boiler is the action of the furnace heat, which will in time destroy any set of grates, but the want of a proper flow of air through the grates will cause overheating, whether it occurs through too little air-space in the grates themselves, or by these spaces becoming obstructed through any cause, thus preventing the cooling effect of the air on its passage to the fire. Another reason is found in the impurities of the coal, and especially in the chemical combinations of sulphur and iron, which impurities are found in more or less quantity in all coals. The Practical Engineer says any coal which forms an easily fused clinker will injuriously affect the grates.

TEMPERING TOOLS

Heat the tool to blood red and quench in a mixture of 1 ounce of white arsenic, 1 ounce spirits of salts, 1 ounce sal. ammoniac, dissolved in 4 gallons of spring water. Draw gently over clean fire until spittle flashes off, then let it cool. Keep the mixture in an iron receptacle for use.

HOW TO PAINT A CANVAS TOP.

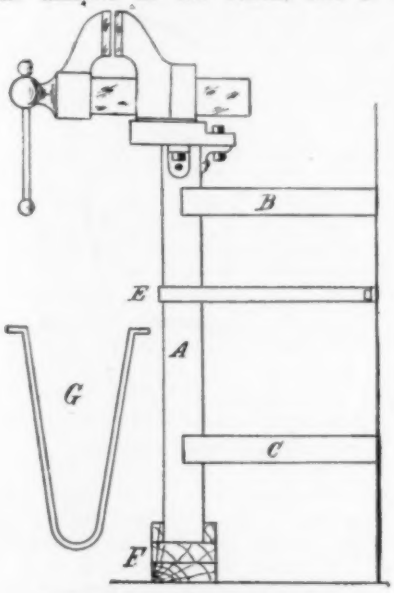
Wet the top thoroughly, using a sponge filled with water and letting the canvas have all it will hold; then apply the paint. Two coats applied in this way will not strike through and will remain in good condition for years.

COPPERING STEEL.

In preparing copperas for steel a few drops of acid (muriatic) will make the solution adhere to oily metal and can be used immediately without waiting for it to dry. Just coat the piece to be coppered and wipe off the remaining moisture with a piece of waste or cloth. To coat brass or bronze with this solution take a bit of waste dampened, and dip it in cast iron dust, then apply to pieces you wish to coat. This gives a fine coppered surface and any lines will show very plain.—W. F. S.

A CONVENIENT VISE ARRANGEMENT FOR FILING.

Having a great deal of filing to do, I built a vise as follows, the letters referring to the figure herewith, says a writer in the American Blacksmith. At A is shown a piece of 3-inch pipe, having three angle lugs riveted to the top with holes to correspond with the holes in the vise. B is the bench, having a half circle cut out of its face to receive the pipe. C is a shelf cut out in the same manner as the bench, and D is a



DEVICE FOR CONVENIENT FILING.

piece of 1¼ by ⅜-inch tire bent as shown at G, and bolted to the wall so that the pipe is free to slide up and down or turn at any angle to get better light. A blow downwards at E fastens the vise in any position or at any height desired, and a slight tap upwards loosens it. F is a block having three different thicknesses, the middle thickness being the one I ordinarily use for convenience. Ever since finished, my satisfaction with it could not be expressed in words.

HANDY INSIDE CALIPERS.

A pair of inside calipers can be made from a scrap of sheet steel, spring or tempered steel is the best, or from an old hacksaw blade. Enlarge or make a hole in each end which will allow two rods ⅛ inch in diameter to pass through. The pressure

Handy Inside Calipers

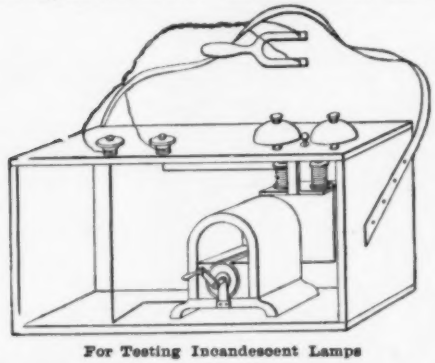
on the rods caused by the spring will be sufficient to hold them firm and they can be adjusted to any inside diameter and the distance measured while they are still in place by a rule, or better still, the rods can have inch marks filed on them.

TO TIGHTEN BABBITT IN A JOURNAL BOX.

Not long ago there was an inquiry as to the best method for tightening babbitt in a journal box. There have been ways and means exploited of doing such work, says the Wood-Worker, but the best way of all is to run a new box, and have the box hot when the metal is poured. To do a job of babbitting and have it theoretically and practically correct, would call for having the box as hot as the metal, so that both might cool and shrink together. That, we know, is out of the question in ordinary practice, but by keeping this fact in mind we are encouraged to have the box as hot as possible when the metal is poured; while, if we do not keep it in mind, we shirk the task of warming the box, till it gets warm weather, and then we only make a bluff at it. This does very well, too, on ordinary shafting, but when we come to machines that run at high speed and tension, the best is none too good, even when its application is to as small a thing as putting metal in a box. Especially should operators of planers take this hint, for while it may worry them temporarily to heat the box hot for running, it will save the chance of enough future worry to pay for it.

QUICK AND EASY METHOD OF TESTING INCANDESCENT LIGHTS.

A convenient testing outfit is made of a generator, a bell from an old telephone box and a wooden fork with metal tips, says a correspondent of The Engineer. The tips of



For Testing Incandescent Lamps

the fork are far enough apart to rest on the binding screws of the rosette and are the terminals of the circuit containing the generator and the bells. Upon turning the generator crank while the fork tips are in contact with the rosette binding screws, the ringing of the bells shows that the lamp and cord being tested are in good order. Always open the switch or remove one of the other lamps before beginning testing.

PLASTER AS A FLUX FOR BRASS.

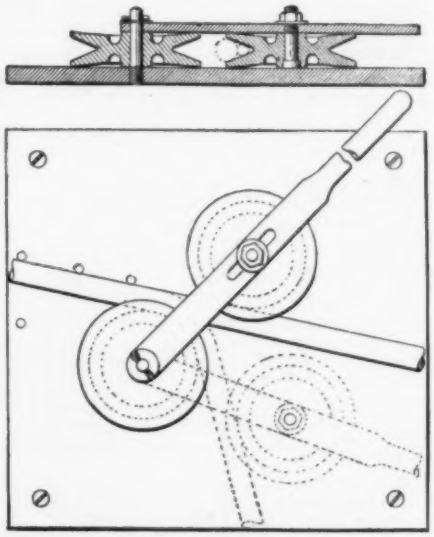
Plaster of paris as a brass foundry flux is strongly recommended by writers on foundry topics, especially where washings, screenings or grindings are to be melted. The method recommended for using plaster of paris for flux in this work is as follows:

Add four or five pounds to 100 pounds of metal, either before the crucible is put into the fire or after it has been in for some time. It is better, however, to have all the flux in the crucible before the metal begins to melt. If possible, it is conducive to better results if the plaster of paris is mixed with the metal and the whole added to the crucible at the same time. Such a procedure insures a more intimate contact with each particle of metal. One need not have any fears about getting a little more than is necessary, as no harm follows, and the flux may be used over again. When the metal is melted and the mass has arrived at a state of complete fluidity, the crucible may be removed from the fire, and the whole mass, flux and all, poured into the ingot moulds. The flux rises to the top, and when cool everything leaves the mould in an excellent manner. Of course the slag may be skimmed off if desired, but as it is usually difficult to completely remove the liquid mass, the former procedure is advocated. The flux does not adhere firmly to the metal, but a few light blows from a hammer always remove it. The flux may be used over several times. So far as the writer's experience has gone, there appears to be no action on the crucible, a feature of the utmost economic importance.

DEVICE FOR BENDING PIPE.

For bending pipe without flattening it the device here shown is one of the best, says a correspondent of The Engineer.

The wheels are made of cast steel and bear on the pipe, top and bottom, thus keeping it from flattening. By this means 1-inch



Bending Pipe Without Flattening It

pipe has been bent to a radius of 5 inches and by a little practice it is possible to bend ½ to 1½-inch pipe to almost any shape.

French morocco which is stamped with stylish designs and sold at a high price in the shape of wall paper, trunk coverings and other articles, is made of old shoes collected in France and sold to factories where they go through a number of processes and come out in the form of paste which is transformed into imitation leather.

A PAIR OF HOME-MADE CLAMPS.

A pair of clamps for small work, for which large clamps would only be in the way, can be made of an old hexagon nut and a bolt.

Cut off two adjoining sides of the nut, as shown in the illustration, leaving that side open. Bore a hole in the middle of one of the edges next the opening, the size of the hole depending on the size of the nut, and screw in a bolt of the proper size and length. The bolt is screwed in contact with the article placed in the clamps. W. K. Smith, of Baltimore, sends us the suggestion.

HOW TO MAKE PAINT ADHERE TO ZINC.

One of our readers, John M. Blake, sends the following:

Some time ago the writer was constructing a piece of apparatus, in which metal zinc was to be the support of a slate surface. This surface was to be made by applying a paint composed of shellac in alcohol, containing pumice stone and lampblack. Just as the affair approached completion, an all-around mechanic, who had become interested, said: "The thing will not work. You cannot make paint stick to zinc."

This remark caused a study of the subject to be in order, and the following experiment was made by the writer:

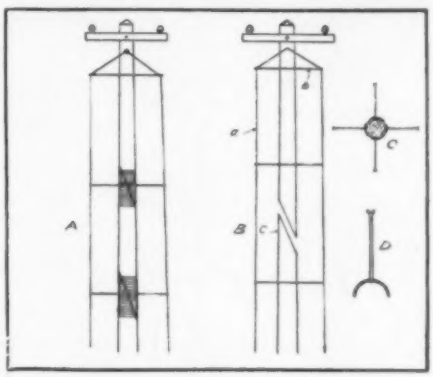
A portion of the "paint" was diluted with alcohol, and the surface of the zinc was well sandpapered while thoroughly wet with the solution—the intention being not to allow any part of the surface to come to the air during, or after the operation of sandpapering. The paint was thick enough to cover securely as it dried. When every part had been gone over carefully, a number of coats were added so as to fill up low places, and the surface was ground with pumice stone.

Time has proved the success of this experiment. Many years have gone by, but the coating holds perfectly, and the matter is now brought forward with the hope that the suggestion may have useful application in ordinary painting. For instance, signs painted upon sheet zinc, clock faces, and perhaps other articles.

The theory upon which this experiment was based is that zinc oxidizes instantly, wherever a fresh surface is exposed to the air. This oxide is so white and thin that it is not visible. Nevertheless, it is present, and forms an unstable attachment for the paint as commonly applied, thus preventing the same from coming in absolute contact with the metal itself. The sandpapering operation under cover of the wet paint, produces a different condition of things.

HOW TO LENGTHEN POLES.

In places on telephone routes where an unusually long pole is needed it is not always necessary to waste time and money in securing one, says the American Telephone Journal. Instead, two or three poles may



Lengthening Poles

be spliced together in the following manner and will be found very strong:

The ends to be spliced together are shaped as at c. They are then tightly bound with wire. At the top of the pole a bolt is driven through and to this four steel wires (a) are attached which are separated by means of spreaders, as shown in Fig. C. Fig. D illustrates the sort of spreader to use. These wires should be brought down to the base of the pole and fastened in a similar manner to that employed at the top. When well done the pole will be as staunch as if it were made of a singe piece of wood. The Fig. A illustrates the use of three poles to secure one long one. The tension wires should be grounded so as to prevent injury from lightning.

HOW TO MAKE A RUST JOINT.

Mix 10 parts iron filings and 3 parts chloride of lime to a paste by means of water. Apply to the joint and clamp up. It will be solid in 12 hours.

PRACTICAL CONDUITS FOR STEAM PIPE.

The best conduit for underground steam pipe is a wooden box large enough to leave two inches of space all around the pipe, says Power. When the pipe has been properly tested and made tight fill the space around it with mineral wool, being careful to keep the wool away from the eyes and any cuts or sores on the hands. Do not use wool made from blast furnace slag, as the acid it contains injures the pipe. The best is made from rock. Be sure the box is full

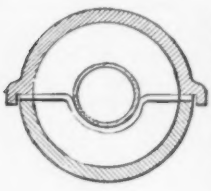


FIG. 2

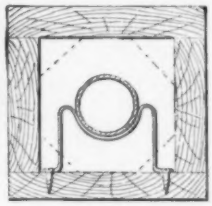


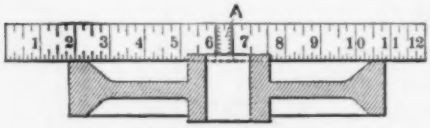
FIG. 1

but do not pack the wool. If the wool is very expensive the corners of the box may be filled as shown in Fig. 1 and the amount needed cut down somewhat. Fasten the cover down with brass screws so that it may be readily removed.

For underground piping in boiler rooms and for long lines of pipe where a permanent conduit is needed Fig. 2 shows an excellent method. It is made of special vitrified tile, like a sewer pipe, split longitudinally with ball and socket joints which may be made up with cement for the bottom half. Leave a joint free every 8 or 10 feet to drain off water. Under either of these conduits place several inches of broken stone to provide for drainage.

AN IMPROVEMENT IN SCALES.

A scale having one or more cross scales marked on vertical lines near its center (A) has recently been patented, says The Patternmaker and will be found useful to the



A Handy Scale

mechanic for many purposes. By laying the scale across the rim of a gear or pulley the height of the hub can be measured on this cross scale.

HOW TO MAKE KNOTS AND HITCHES.

Every machinist and mechanic should be an expert in making knots and hitches. The time lost in fussing with a rope or chain where the workmen do not know what kind of a hitch to use nor how to tie it, amounts to many dollars during the year. Then there is the always present danger of damage to the piece hoisted, and injury to the men engaged in the work, where hoisting is carelessly done. One of the best articles on this subject that has appeared in a long time we extract from the American Machinist. The directions and illustrations are so simple and plain anyone can learn the trick by experimenting with a piece of soft rope. The writer, who is evidently an expert, says:

Fig. 1, made by two endless slings and used as shown in Fig. 2, is a reliable basket hitch when both slings are of equal length, or with one sling long enough to take in one-half of the cylinder's diameter and the other to run through both loops of the smaller and have its own loops catch the chain hook.

Some people hoist a shaft endwise by using a collar or lathe-dog as a safety stay; others use the bitting-rolling hitch shown in Fig. 3, but in one conservative concern whose screw and bolt department, on the fifth floor, is provided with an independent hoist chain, they use the rig shown in Fig. 4. The bucket is hoisted above the floor level and then pulled in as the hoistway is reversed and made to lower away.

It is a very common practice, in the absence of a ready-made endless sling, to tie a flat knot in a short length of rope and use it in lieu of a sling. Be careful to avoid a "granny knot," Fig. 5, which is unsafe and which we all know about; but there is another fool trick that can easily be played with this knot, and I was just chump enough to work it. As it may be new to some of my readers, I will tell you how to get into my class. We were lowering a bed-plate, and as it was going down, to help keep it clear of the building, I took hold of A, Fig. 5 (you might take B, for a change) and gave it a good, strong pull, and down came the bed-plate with a rush. I was too busy saving the pieces just then to figure it all out, but I have since worried it out to this: My pull at A, Fig. 6, caused the loop to double back, as shown in Fig. 7, and then the weight of the bed-plate pulled A out of my hand, through the double loop,

and, presto! the trick was done. In making a flat knot with chains, a piece of pipe or wood should be run into it as shown by Fig. 5 to prevent jamming.

The next is made without passing the end, and provides two loops to which a tackle block can be hooked. Fig. 9 shows the start; Fig. 10, the second stage; Fig. 11, the

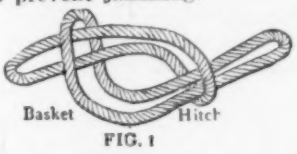


FIG. 1

FIG. 2

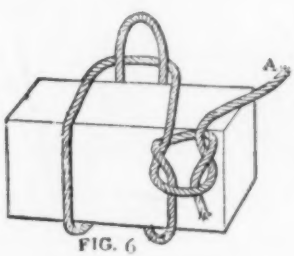


FIG. 6

FIG. 3

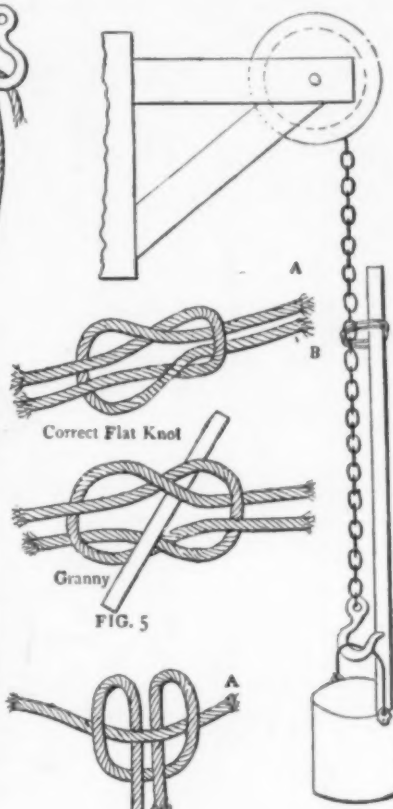


FIG. 5

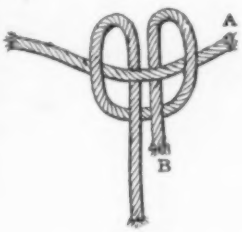


FIG. 7

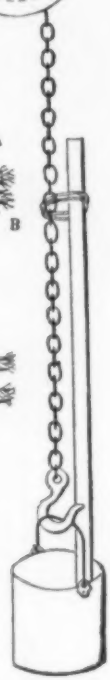


FIG. 4

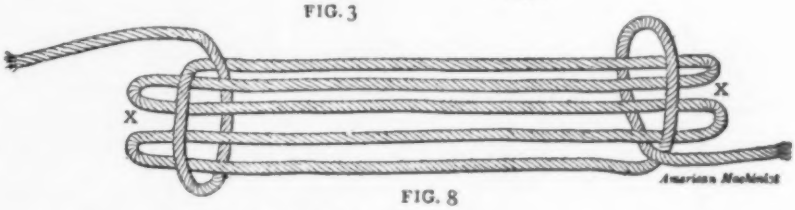


FIG. 8

KNOTS AND HITCHES.

Fig. 8 shows a good and safe way, known as a sheepshank, of shortening a long rope. It is self-evident that any amount and any length of loop may be used, but it must be carefully borne in mind that at least a 6-inch length of overlap loop at X X is essential to absolute safety.

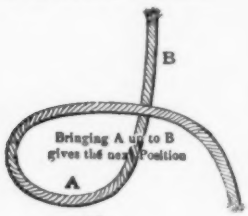
manner of rolling the two loops into the standing portion of the rope, and Fig. 12, the two loops X X brought vertically down (after rolling) and ready for service. The block or fall must be hooked into *both* loops. The above is a safe and reliable hitch that can be wiggled in at any point

in a rope, and besides being perfectly reliable, it is easily and quickly made and unmade.

Fig. 13 is an old and well-known friend of the rigger, but machinists should beware how they use it on Friday, as it has been known to betray a trust.

Fig. 14 is a simple and safe way to take a temporary hold, but as the mere shifting of the weighted loop will suffice to loosen the whole rig, the need of keeping meddlers away must be obvious.

Fig. 15 shows how in using a chain block whose hoisting and lowering range is



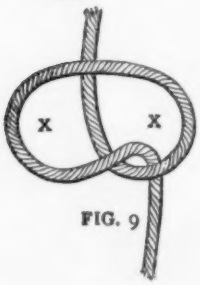


FIG. 9

FIG. 10

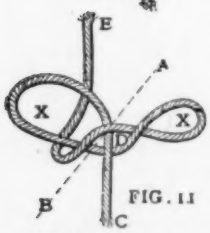


FIG. 11

The first turn of the loops XX should bring rope end C through loop D. Two more turns upward should then be taken along cross A B

FIG. 12

FIG. 13

FIG. 15

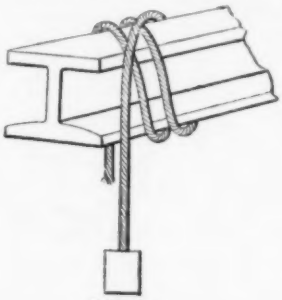


FIG. 14

FIG. 16

FIG. 17

FIG. 18

FIG. 19

FIG. 20

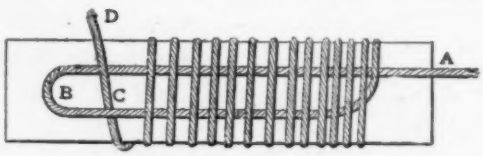


FIG. 21

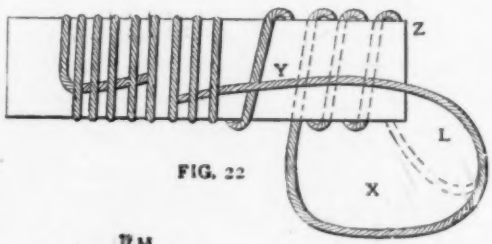


FIG. 22

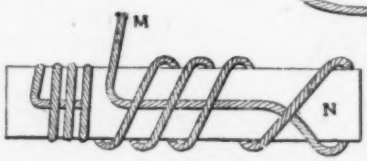


FIG 23

American Machinist

KNOTS AND HITCHES.

necessarily confined to the limit of its chain length, the weight may be raised or lowered to any distance. Thus in Fig. 15 the chain travel is only 10 feet, but the weight has to be raised 20 feet. We lower the chain and hook into the rope at A, hoist the 10 feet and make the free rope's end B fast to any convenient projection overhead (if necessary, even to the chain block's suspending hook C). We now unhook and lower the chain again for its new *previously prepared hold* lower down, as at D, and up she goes, the 20 feet, or any other old distance. We emphasize *previously prepared hold* advisedly, as, if not so prepared, it will be found impossible to wiggle in a hold for the hook in the tautened rope. Fig. 13 cannot be used for second holds, and positively must not be used as a starter, or first hold, because, after fastening at C, it will be found both hard and dangerous to slip the hook out of it.

Either the doubled-up, non-slipping loop, Fig. 16, or bowlines should be used all along the line.

Speaking of bowlines, the slack line X may go either in front or back of the standing rope Y, as shown in Figs. 17 and 18; but in either case, after going around Y, it must be passed through the loop Z in the manner shown at Fig. 19. Passing it through as shown at Fig. 20 cuts out the non-slipping feature and reduces the bowline to a farce.

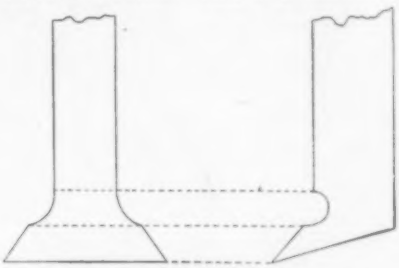
A broken hammer handle, a split monkey-wrench handle, etc., may be nicely repaired by the endless-wound splice, Fig. 21. The make-up is, we think, pretty clear as shown, and it is evident that by pulling at A the loop B will make a similar loop in D at C, and that continued pull will draw the crossed loops out of sight. The loop ends may then be closely cut off.

Fig. 22 is preferable for extra neat work, in that it does away with the bulge caused by the crossed loops. Until the loop X is got to all is plain sailing. The rope Y must then be held steadily in its place on the stick Z while the loop is swung around both it and the stick, as shown by the dotted outline. Only at the finish (shown in Fig. 23) should Y be allowed to move. Then it, as a part of loop L should be swung round the stick as shown at N. Setting the coils close and drawing up at M completes the job.

Always, and above all, in using ropes do not abuse them. Bagging, burlap, even waste or paper, if the first are not to be had, should always be interposed between a rope and all hard, angled, even if not sharp, edges.

A PLANER TOOL.

A handy planer tool for facing is made as shown herewith. This tool can be used



Handy Planer Tool

for either right or left-hand, or for both if need be. W. K. Smith, of Baltimore, contrived the tool.

RECIPE FOR TEMPERING CHISELS.

The following tempering recipe is sent us by a subscriber.

To 3 gallons water add 3 ounces spirits nitre, 3 ounces white vitriol, 3 ounces sal. ammoniac, 3 ounces alum, 6 ounces salt with a double handful of hoof parings. Heat tool to cherry red. This has put new life in steel that has apparently been burned, and is used to temper chisels for cutting French burr stones.

HOW TO TEMPER KNIVES.

After forging the knife to the shape and size desired make a box large enough for it and 4 inches deep. Fill the box two-thirds full with barrel salt and make a little trench in the salt. Heat the knife from the back cherry red; place it in the trench of salt, edge down; and cover it with salt. Let it remain until cool when it may be ground.

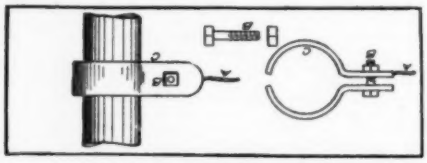
CONTRIBUTIONS INVITED.

Our readers are invited to send in any new kinks which would be of service to others. When you happen on something good in your own experience let us give others the benefit of your skill.

Use smoked shellac for cementing jet, first warming the broken edges.

MAKING GOOD GROUND CONNECTIONS.

For making ground connections to pipes the method here shown is especially good. The pipe should be thoroughly cleaned and brightened and then the simple clips



Good Ground Connection to Pipes

shown in the diagram fastened on. Use the nuts and screws from worn-out dry batteries for fastening the clamps to the pipe. The device can be readily removed for cleaning, says the Telephone Journal.

TO CONVERT A STEAM RADIATOR INTO A BAKE OVEN.

One who needs an oven to make various tests, will find the following description very timely. Sometimes there is not sufficient room to build one, and again it may be considered too expensive, consequently a person attempts to get along without it.

The electrician or repair man requires an oven to bake small field coils and armatures, and to test insulating varnishes, for one is not supposed to take the word of any one as to the quality of such an important article.

The cast-iron radiator should be 3 inches wide and 38 inches high, or its equivalent, to obtain a temperature of 190 deg. Fahr., which is the highest temperature allowable for insulating varnishes.

Nail strips of wood on the floor on at least three sides of the radiator. Make the oven from sheet iron, and set it down over the radiator. Fasten to the strips of wood with screws. There should be at least 10 inches air space above the radiator. Have a hinged door in the upper part of the front of the oven, with a clasp for locking. Fit the cork holder of a varnish can in the top of the oven, to retain a cork through which there is a hole to receive a tube thermometer. This is always a necessity. Heavy iron wire can be fastened from end to end of the oven on which samples can be placed to dry.

By leaving it uncovered, the oven will not cut off too much heat in winter. During this time, when not in use, the door may be left open.

Pieces of paper dipped in insulating varnish can be hung on the wires to make the heat test. Armalac and like varnishes are similarly tested. Endurance tests are make in this way for a period of two or three weeks.

FIRST THINGS TO DO IN CASE OF SPRAINS OR DISLOCATIONS.

The most important thing is to secure rest until the arrival of the surgeon. If the sprain is in the ankle or foot, place a folded towel around the part and cover with a bandage. Apply moist heat. The foot should be immersed in a bucket of hot water and more hot water added from time to time, so that it can be kept as hot as can be borne for fifteen or twenty minutes, after which a firm bandage should be applied (by a surgeon, if possible) and the foot elevated.

In sprains of the wrist, a straight piece of wood should be used as a splint; cover with cotton or wool to make it soft, and lightly bandage, and carry the arm in a sling. In all cases of sprain the results may be serious, and a surgeon should be obtained as soon as possible. After the acute symptoms of pain and swelling have subsided, it is still necessary that the joint should have complete rest by the use of a splint and bandage and such applications as the surgeon may direct.

Simple dislocation of the fingers can be put in place by strong pulling, aided by a little pressure on the part of the bones nearest the joint.

The best that can be done in most cases is to put the part in the position easiest to the sufferer, and to apply cold wet cloths, while awaiting the arrival of a surgeon.

HUNT'S TEMPERING RECIPE.

For heavy planer or lathe tools, when steel has been selected at random and is found a little too low in hardening properties for the purpose, to one pail of water (soft), add ¼ pound cyanide potassium, 1 pound salt, 1 dessert spoonful oil of vitriol. Draw the temper slightly.

FILLING AUTOMOBILE TIRES.

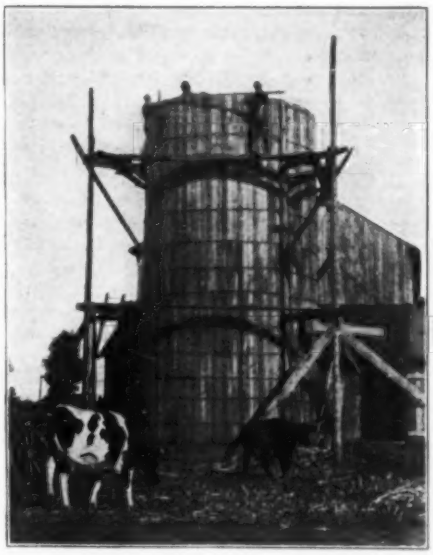
A fluid is now used for filling automobile tires and it can be injected without the tire being removed. It comes bottled and the owner of the machine can fill his own tires.

Construction and Use of a Silo

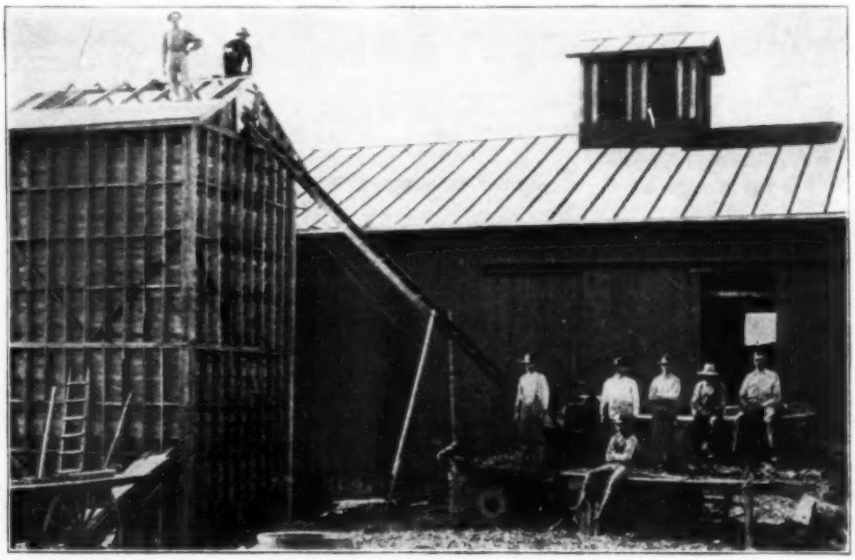
Provides Green Food for Cattle During Winter Months

The farmers of the country are today giving more attention to the building of silos and the raising of ensilage corn to fill them than ever before. Twenty-five years ago there was not a silo to be found in the United States. Subsequently the news of their advantages came to this country from France. At first square silos were built. Since that time there has been an evolution in the construction, and most modern ones are round. In Ohio, where the accompanying photographs were made, it is said that five years ago there was but one silo to every one hundred farmers. Today, especially in northern Ohio, it would be difficult to ride five miles in any of the rural districts without coming across a half dozen silos.

Ensilage corn grows much larger than ordinary corn, sometimes attaining a height of fourteen feet. While the stalks are yet green this corn is cut in the field by a machine drawn by a team of horses. After the product of several acres has been hauled to the site of a silo, a cutting machine is employed which chops the green stalks into lengths one and a half inches long. These are lifted by two methods to the opening at the top of the silo. One way is to convey them upon a continuous carrier such as shown in one of the photographs. By another method they are blown to the top of the silo through a large pipe. Silo filling time on the farm nowadays is something like threshing day. A large force of men



Constructing a Round Silo

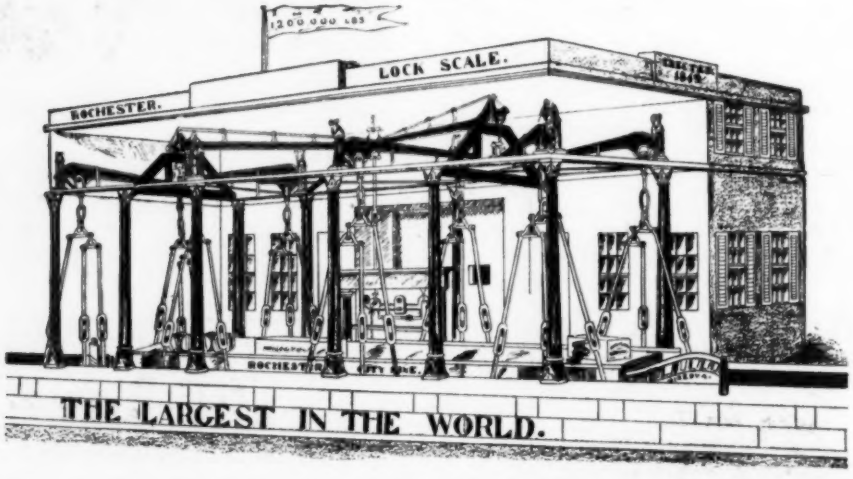


Filling a Square Silo with Ensilage

accompany the silo-cutting machine and the whole work is done in a day or two. Ensilage is valued as a milk producer. Cattle feeding on this green feed in winter give larger quantities of milk. Not only corn but clover, rye and grass may be converted into ensilage.

The silo is the building in which the ensilage is stored. A silo 25 feet high and with a diameter of 12 feet will contain 50 tons of ensilage—the product of four acres of ground. Some silos are built larger. Silos are usually built of pine, hemlock or cedar, although cement is now being used in many places. The cost runs from $75 to $200. The first operation in the erection of one of these towers is to dig an excavation for the foundation, fill it with stone and cement it over. Nowadays silos built at factories in different parts of the country are shipped to the farmer in pieces, all ready to be put up. Two or three hands erect them in a short time. The sides are airtight, in order that the contents may be kept green. The construction of a round silo is somewhat after the plan of the staves and hoops of a barrel. A series of doors is arranged down one side. In winter, beginning at the top, these doors are opened as the silo is emptied. Square corners are said to retard rapid and thorough packing at the time of the filling of the silos, therefore, even silos which are built square have rounded corners within.

Largest Scales Ever Built



The Great Scale at Rochester, Used for Weighing Ships on the Erie Canal--Capacity, 1,200,000 Pounds

In striking contrast to the diminutive scales used by apothecaries for measuring grains, scruples and drachms are the monster scales on the Erie canal used for weighing canal boats and their contents. They are the largest scales in the world today and the largest ever built. They were designed for ascertaining the tonnage of canal boats by weighing the boat and its load. It was a mammoth undertaking that is somewhat of a reflection on the intellectuality of New York state, for there are few 16-year-old boys in any other part of the world that could not determine a vessel's tonnage by its water displacement. H. A. Foss, in the Grain Dealer's Journal, says: "Just why the State of New York should have built a scale to ascertain the tonnage of boats is a mystery to me, as most any school boy knows how to figure vessel tonnage by displacement, which method would have done away with the immense expense incurred in the operating and building of so large a scale. This might possibly have been one of the boodle schemes which have been so numerous in the political management of the Erie canal."

The wonderful ship scales were erected in 1849. They have a capacity of 1,200,000 pounds.

MECHANICS FOR YOUNG AMERICA

HOW TO MAKE A BAGGAGE CARRIER FOR BICYCLES.

Here is an appliance for fastening books and packages on to the bicycle when starting for a ride in such a secure manner that they can neither be lost or injured.

A box 12 inches long, 8½ inches wide and 6½ inches deep is supported over the back wheel by two uprights clamped to the rear fork and by an iron clamp to the saddle-post. The box is made of well dried wood, the sides and lid being ¼ inch thick, the ends ⅜ inch and the bottom ¾ inch. The uprights A A, Fig. 1, are of ½x⅞-inch oak and are bolted to the bottom. They are strengthened by the iron brace B, Fig. 1, which is made of 1 x ⅛-inch iron. The uprights grip the rear forks by the simple clamp shown in Fig. 2. The iron strips c c Fig. 1, that run from the rear lower corner of the box to the upper forward corner and to the saddle-post are 1 x ⅛-inch iron and are firmly held to the box on each side by five screws. These strips are formed into the clamp shown in Fig. 3.

The lid opens backward and is held closed by the snap detailed in Fig. 4. The dotted outline shows the position the snap takes when the lip opens and closes; ½ to ⅛-inch iron is used in making this snap. The screw at the bottom of the iron piece acts as a hinge. A strap passing through the bottom so that it can be tightened around articles to be carried will prevent them from being shaken about and causing unnecessary noise. A coat of black enamel gives it a finished look. It has been tested with 135 pounds and found none the worse for wear.

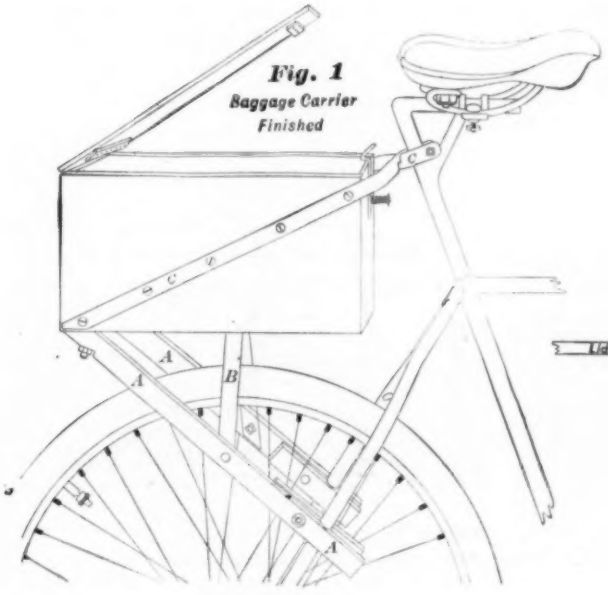


Fig. 1
Baggage Carrier Finished

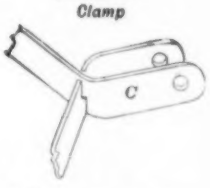
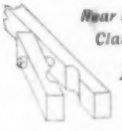


Fig. 3
Saddle Post Clamp



Rear Fork Clamp

Fig. 2

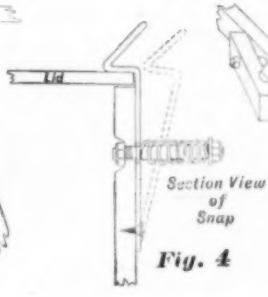


Fig. 4

A WATER CANDLESTICK.

A glass of water makes a fine emergency candlestick. Weight one end of the candle with a nail just large enough to hold the candle in the water so that the water touches its top edge, but does not touch the wick, and then light the candle.

It will burn until the last vestige of wick is gone and the flame will not flicker. The melted tallow that runs down but serves to hold the candle more stationary.

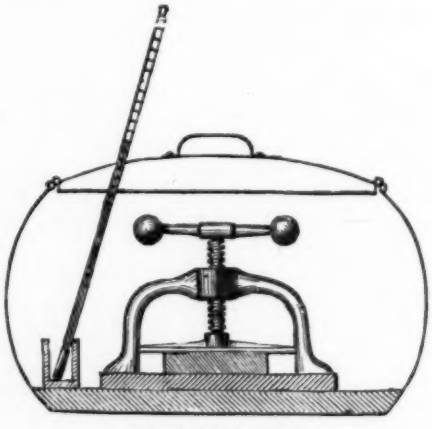
HOW TO MAKE RUBBER STAMPS

India rubber, especially prepared for stamp-making, should be procured from a dealer or manufacturer, if good results are to be obtained. As an experiment, it is possible for an amateur to prepare the rubber, but, in such cases, it is always attended with uncertain results. The mixed uncured rubber comes in white sheets, strong, firm and about one-eighth inch thick, and for its manipulation a press is indispensable, but can be home-made.

For the base of the press use a piece of iron, having two holes drilled in it at the middle of opposite sides, through which pass bolts, letting the thread ends extend upward and counter-sinking places for the bolt heads to keep the under side of the base level. Solder the bolts in place at the base. The upper part of the press, or the platen, is also of iron, cut so it can be swung off the bolts, rather than by removing the nuts and lifting it off. String a half dozen nuts, larger than those which screw on, on each bolt, so that when the upper nut on each is screwed to the extent of the thread the pressure will be communicated through the nuts wedged in between the platen and the upper nut. The bolt holes in the platen should be directly over those in the base. Distance pieces of an exact thickness should be provided for use on the base; these serve to keep the pressure even.

In preparing the mould, if type is to be copied, use rather large type with wide spaces and set up with high quads and spaces, or the type faces may be filled up by rubbing with either wax, or soap, lightly brushing off any that remains loose. The type so set should be locked into a frame. This may be made of two pieces of wood bolted together at both ends, or of printer's furniture. Place it on a flat surface (marble is good, but any perfectly smooth surface will do) and place distance pieces one-eighth inch higher than its upper surface on either side of it. Apply olive oil to the type faces and wipe off any excess. To form the matrix or reverse of the model, take a piece of iron larger than the inscription to be copied, and spread upon it to a depth of a quarter of an inch a putty made by mixing plaster of paris and water to the right consistency. By means of a table knife spread the plaster smoothly and then invert the plate upon the model and press down until the distance pieces are struck. Let it set 10 minutes and then remove. If care has been taken the matrix will be perfect. After it has thoroughly dried, preferably in an oven, saturate it with an alcoholic solution of shellac to strengthen it.

Cut a piece of smooth rubber, large enough to cover the matrix, from the sheet, throw this into a box of talc, or powdered soapstone, so that it receives a coating on both sides; dust a little of the powder over the matrix, also. Place the press on a support over a gas burner, or a kerosene lamp, and apply the heat. Place the matrix on the base of the press, dust off the piece of india rubber and place in the press upon the matrix and screw down the platen. Heat the press to 284 degrees F. (140 degrees C) and keep screwing down the platen so that the rubber, now soft and putty-like, is forced into every recess of the matrix. A

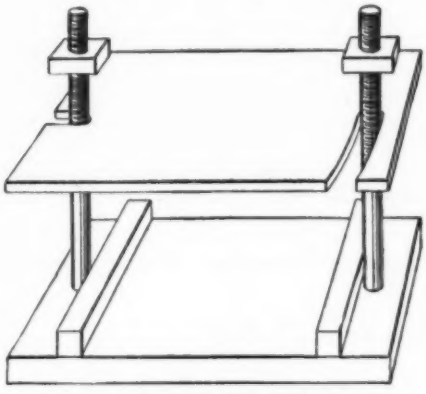


Fish Kettle Vulcanizer

thermometer is not necessary; some rubber always protrudes and the stage of the process can be told from that. At first it is quite elastic, then as the heat increases it becomes soft, then the curing begins and it again becomes elastic, so that, if a point of a knife blade is pressed against it, it resumes its shape when the point is removed. When this takes place it is then thoroughly vulcanized and the sheet can be removed from the matrix. Ten minutes, under favorable conditions, is sufficient time for moulding the rubber. By means of common glue, or a cement, composed of Stockholm pitch, 3 parts; American resin, 3 parts; unmixed india rubber 6 parts; oil of turpentine, 12 parts, heated and thoroughly mixed, fasten the rubber stamp to a wooden handle.

It is possible to dispense with the press in making stamps, where the work is not done in quantities, and use a hot flat-iron.

The matrix is placed on a stove at low heat, the rubber laid on and the hot iron applied. But a few moments are required to mould it.



Vulcanizing Press for Rubber Stamps

An old letter press if it be inclosed in a tin oven makes a good press, or all the necessary materials and apparatus can be purchased from a dealer. Any type such as all printers use will answer.

MOTOR TRAIN TRANSPORTATION OF TROOPS.

Germany is utilizing the motor car for the movement of troops, and the practice operation of these trains is becoming a familiar sight. The excellent character of the German highways makes the plan practical and economical. One motor car will draw several of the troop wagons containing as high as 200 soldiers with their ordinary marching

Motor Car Train for the German Army

outfit. Other wagon trains follow, carrying tents, ammunition, supplies, etc. The distance covered is about double that which the men would make in a day's march.

A Boston lawyer has invented a machine by which many difficult cases of hip dislocation are successfully treated.

COAL MINING DEPTH HAS A LIMIT.

Heat and dust are greater menaces to our coal supply than is the rate of exhaustion or any lack of ingenuity among our engineers. The Royal Coal Supplies Commission of England have fixed the coal mining limit depth at 4,000 vertical feet below the surface, and even that depth is not possible unless the air supplied for ventilation be very dry.

The rate of increase of heat varies in different districts. In some it increases one degree in 40 feet and in others one degree in 60, 80 or 100 feet. On the average, below a depth of 4,000 feet the human body cannot adapt itself to the conditions. Medical authorities state that the highest temperature in dry air at which a man can do hard work is 98 degrees. In air that contains very much moisture he cannot work where the temperature is above 84.

The fact that the air supplied to the miner must be perfectly dry removes one means devised for his comfort: that of spraying. Of course, the greater the heat the dustier the mine. For a while, spraying and other watering contrivances were used to lay the dust, but these means had to be abandoned because they increased the humidity of the air.

Means of conveying the coal from great depths, means of ventilation and in fact nearly all the engineering problems of the coal mine are comparatively easy beside the problem of cooling the air so the men can work below the limitation depth.

VIBRATING FURNITURE.

The illustration is self-explanatory of the latest thing in comfort furniture. Couches, rockers and cribs are now made in this

An Easy Couch

style which is light and airy. The tray at the base is large enough to contain books and other reading matter.

FRENCH INVENTORS ARE WORKING ON AUTO FLYING-MACHINES.

The French inventors are diligentiy studying the subject of aerial navigation in its three branches, namely, elevation, suspensibility while moving about and propulsion, learning all they can about the first branch before proceeding to the second. On the subject of elevation some interesting results have been obtained.

The first model, while very different from the more recent ones, made a good foundation for further experiments. It was a bicycle-like affair in which the legs of the aerial navigator worked pedals which in turn caused the fans or helices at the top to rotate. By this means it was fully demonstrated that a pull of 15½ pounds could be obtained.

Pedal Test

In the next model a gasoline motor supplied the power with a greater pull of 44 pounds. Frequent changes were made in the helices until mathematical correctness as to size, weight and form had been obtained. This brought it down to the use of two large helices and two smaller ones, additional support being required for the smaller ones which create such a violent wind that no one can venture near them. These, with the oil motor gave a resistance of about 159 pounds.

The next change was the substitution of a 9-horsepower electric motor for the gasoline motor. Results were highly increased by this and the inventors believe the question of elevation is settled. The small helices rotate 400 times to the large helices' 200.

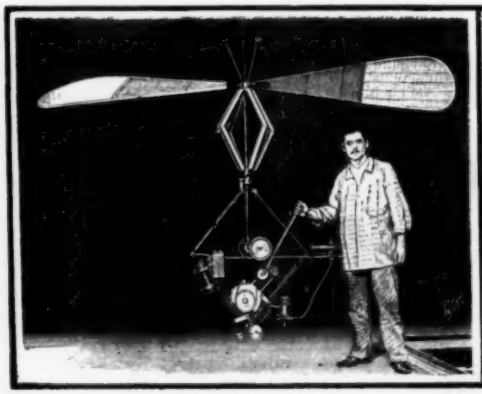
Interesting developments along the lines of suspensibility in motion and propulsion are expected.

FRENCH MUSHROOMS GROWN IN CAVES.

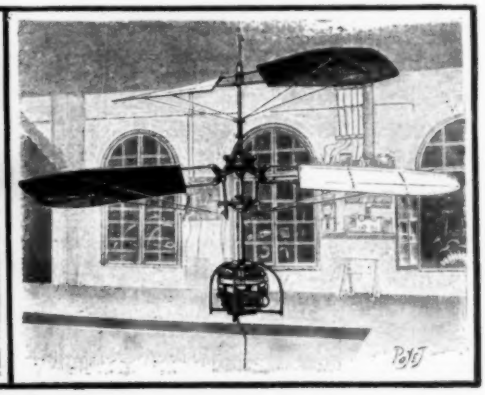
French mushrooms, held as a rare delicacy by all epicures, are raised in caves. Those consumed in Paris are grown in the disused quarries which honeycomb the country to the south of the city. Some of these excavations are of enormous extent and some have horizontal galleries or levels at various depths. But usually they have only one gallery which may be half a mile in length and from 30 to 150 feet below the surface. John K. Gowdy, United States consul-general at Paris, says:

"These galleries are generally from 7 to 10 feet in height. They are in most cases wide enough for two rows of beds with a footway 18 inches wide down the center. About three tons of these cave-grown mushrooms are sent to market every day and the total value of the trade is about $3,000,000 a year."

In the Ozark mountains of Missouri and some other parts of the United States mushrooms are also successfully grown in caves, while in recent years cellars have been utilized for the purpose.



Gasoline Motor



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One of the exhibits of the life-saving service at St. Louis will consist of the original mortar and first cannon ball used in this country to assist in rescuing persons from a wrecked vessel. The cannon ball was only recovered a few years ago, after having rested on the bottom of the ocean for nearly fifty years. The rescue in question occurred in 1850 on the New Jersey coast, and 200 persons were saved. The cannon ball—a murderous looking object nearly a foot in diameter—with a rope attached, was fired from the mortar and landed plump on the deck. The vessel went to pieces and the cannon ball was buried in the sands among the ship's timbers. The Jersey shore at that place is constantly shifting by the action of the wind and waves, and some ten years ago the waters receded and exposed the remains of an old wreck. Among the timbers of the craft was found the cannon ball fired to carry a line to the shipwrecked crew and passengers.

Have you seen "Shop Notes"? Of interest to every mechanic.

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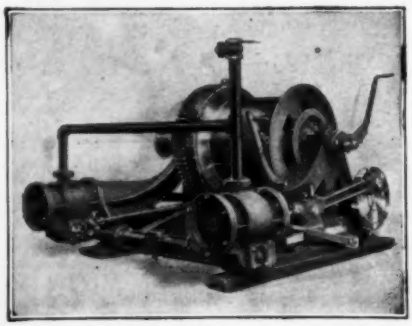

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WHERE CLEAN WATER COMES HIGH.

In one of the northern districts of England, in a little town, the authorities have established a fine public bath. In order to make the undertaking self-sustaining a fee is charged the bathers, and over the door is a sign which says: "Rates for Baths—Monday, 6d; Tuesday, 5d; Wednesday, 4d; Thursday, 3d; Friday, 2d; Saturday, 1d."

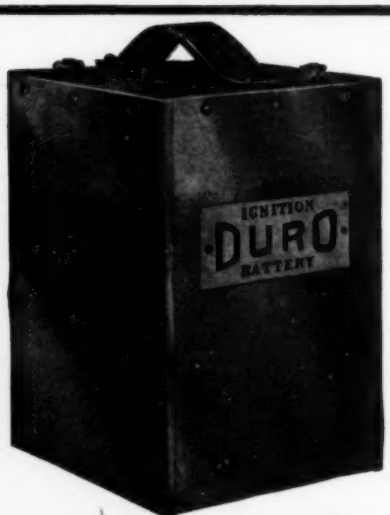
An American whose curiosity was aroused at this sliding scale was given the explanation. Water is scarce in the town, and consequently high in cost. The baths are closed Sunday, but early Monday morning the tank is emptied and refilled. That day the charge is 6d. As the water is not changed again for one week, and is in constant use during all that time, the price is graded in proportion to the length of time it has been in use.

As the traveller happened to be there on the day when the price was only 1d, he concluded he did not require a bath just at that moment.

COLD ZONE MOVING SOUTH.

The cold summers of the past few years causes a noted French scientist to predict a movement southward of the cold zone. The Literary Digest translates the following from his article:

"Has any definite light been thrown on this question of precessional action? We can hardly pretend that it has. Incontestably we must still observe and study it. But we are entitled to think that though we may not have reached the goal, we are not far from it. . . . We are moving toward a cold maximum. . . . We are doing only what the earth has done since the beginning and will continue to do to the end. Our regions, like others, will see again what they have already seen—that is to say, to go back to the subject of the vine, we can predict in advance the fate that is reserved for it. Without any doubt, in less than 400 years the champagne country will have lost its vines, and 500 years hence Bourgogne and the Gironde will themselves be deprived of vineyards. There will remain only Provence, which 2,000 years ago began viticulture. In its turn it will have to yield, probably within 1,500 or 1,600 years. As for Paris, in 10,000 years at the culminating point of the present climate phase it will have about the same annual temperatures as Berlin has now."



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TO RECEIVE BY RETURN MAIL, POSTPAID, the largest, handsomest, most complete and by far the lowest priced general merchandise catalogue ever published. **NEVER BEFORE SOLD FOR LESS THAN 50 CENTS. Worth easily $5.00.** Now FREE to anyone for the asking. Cut this ad. out and send to us or on a postal card, say: **"SEND ME YOUR BIG No. 114 CATALOGUE FREE," and it will GO TO YOU BY RETURN MAIL FREE, POSTPAID.**

ENORMOUS SIZE, BIGGER THAN EVER. **1,200 large 9x12 pages, over 100,000 quotations, over 10,000 illustrations.** Our new and marvelously low price making policy fully explained; 55 vast merchandise departments fully represented, much larger than ever before; prices much lower than ever before. **New and lower prices** on everything carried and sold in **the largest store in the world.** Makes all other catalogues look very small. **Makes all other prices look very high.**

WHAT BELONGS TO YOU **is shown in one section of the Big Book.** If you have ever bought anything from us, or if you ever do buy anything from us, then **something in this big business belongs to you,** and it is all explained in a 16-page section **OF THE BIG BOOK. THIS PART OF THE BOOK is YOURS, not OURS; The most liberal offer ever heard of.**

16 PAGES—YOUR PAGES **devoted to explaining how you can make money by sending to us for goods.** How you can make money by getting others to send to us. **A BIG CHANGE FOR DEALERS. MONEY MAKING MADE EASY FOR EVERYONE. THE GRANDEST OFFER OF THE AGE. AN OPPORTUNITY THAT IS YOURS—SOMETHING THAT BELONGS TO YOU.**

QUICKER SHIPMENT **THAN ANY OTHER HOUSE.** As we carry in stock constantly all kinds of merchandise in amounts far greater than all other mail order houses combined and we have factories and warehouses for immediate shipment South, North, East and West, we can ship you goods much quicker than any other house. If you send your order to us, no matter where you live, you will get your goods in just a few days, usually less than one-half the time it takes to get goods from other houses, and on a great many goods you order from us you will have less than one-half the freight charges you would have to pay if you ordered from anyone else, for if your order contains goods we can ship from one of our factories or warehouses near you, we will ship from the warehouse nearest you, bringing the goods to you in a day or two at a very low freight rate.

OURS IS THE LARGEST MAIL ORDER HOUSE IN THE WORLD.

We sell and ship more goods than all other mail order houses in the United States combined. Other mail order houses are mere side shows compared with ours. If everyone only knew how much greater values we give on all kinds of merchandise than any other house, no other mail order house would ever again get even a single order.

THE ONLY MAIL ORDER HOUSE

that owns or controls a vast number of factories located north, south, east and west, situated so that we can ship many goods from our factory or warehouse nearest you, making quick delivery and very low freight charges. Southern factories and warehouses for southern people. Northern factories and warehouses for northern people, etc.

OUR FREE BIG No. 114 CATALOGUE **EXPLAINS WHY, AS COMPARED WITH ANY OTHER HOUSE, WE CAN MAKE PRICES SO MUCH LOWER, SHIP SO MUCH QUICKER, FREIGHT CHARGES SO MUCH LOWER, QUALITY SO MUCH HIGHER,** why we can give every customer a big money making opportunity.

SEND FOR OUR FREE NO. 114 CATALOGUE. Cut this ad. out and send to us, or on a postal card say, "Send me your No. 114 Catalogue" and the big book will go to you by return mail postpaid, **free; all our new offers, our new money making proposition;** an opportunity never before known, **all will go to you free by return mail, postpaid. DON'T BUY ANYTHING ANYWHERE UNTIL YOU GET OUR NEW No. 114 CATALOGUE. Tell your neighbors not to buy anything at home or elsewhere until they write for OUR No. 114 CATALOGUE.**

DON'T BUY A CATALOGUE. Don't send anyone 5, 10 or 15 cents for a catalogue, when you can get our **BIG No. 114 BOOK for nothing. FREE FOR THE ASKING. WORTH 100 TIMES AS MUCH TO YOU** as all other general merchandise catalogues printed. **WRITE FOR IT TODAY. DO IT NOW. IF YOU SEND FOR THIS FREE BIG No. 114 CATALOGUE,** hand our old catalogue (if you have one) **TO SOME FRIEND** and in your letter or on the postal card give us the **NAME OF THE PARTY TO WHOM YOU HANDED OUR OLD CATALOGUE.**

Address SEARS, ROEBUCK & CO., CHICAGO, ILL.

PAYING THE HANDS AT A BIG AMERICAN FACTORY.

In many of our large American factories the task of paying off the men each week means a hard day's work for a large force of clerks. In the early morning the bulky packages of money in many denominations are carried under guard from bank to carriage, conveyed to the office of the corporation and then the hard work begins.

At each of a number of polished tables sit several clerks and when the paymaster throws one of the heavy bags of money on the table these clerks fall to and count for all they're worth. As each bag is counted it is checked off the list held by the paymaster and if the amounts do not tally with his memoranda it must be counted again. This work requires fully an hour, and is, perhaps, the easiest part of the task.

Then before the first man at each table is placed a pile of bills, heaps of small change and a tray full of envelopes, each of which bears the number of a hand and the amount of money due him. The first man at each table picks up an envelope, counts out the required sum and passes it and the envelope to the next clerk, who likewise counts it and passes it on. In this way all the men at one table count the money in turn and the last one packs it into an envelope. An error could not easily occur and the envelopes pass from hand to hand with hardly a pause.

The money remaining when all the envelopes are filled is then counted and added to the sum total of that in the envelopes. If it balances with the original amount, well and good; if not, it must all be counted again. A recount is rarely necessary, however.

The paymaster makes what reductions in the pay may be necessary for any reason and the envelopes are then packed for the respective pay stations at the factories. Each separate station is in charge of a clerk, who having arrived at his station, arranges the contents of his box on a shelf, stations himself behind the wire grating, while an assistant stands just outside. Shortly after six the line of hands begins to form. The first man hands his check to the assistant, who calls out the number. The clerk hands the assistant the proper envelope; the assistant compares it with the check and hands it to the hand. Gradually the line marches steadily past, and meanwhile a steady stream of envelopes flows out.

In 20 minutes about 800 hands have been paid and the clerks go back to the office, count over the checks received, add up any envelopes which may be left, and so the all day's job is ended.

89 CENTS FOR A NEW 1905 HEATING STOVE

HOW WE CAN SELL a new 1905 model high grade heating stove under our BINDING GUARANTEE for only EIGHTY NINE CENTS. Not a deposit of 89 cents, with something to pay later on, but just 89 cents to pay; no more, no less. HOW WE CAN DO IT AND WHY WE DO IT IS FULLY EXPLAINED IN OUR NEW FREE 1905 SPECIAL STOVE CATALOGUE, JUST OUT.

OUR FREE STOVE CATALOGUE illustrates and describes our New 1905 Style Heating Stove, which we sell for 89 cents; explains our new and marvelously low price making policy, illustrates and describes an almost endless variety of Heating and Cooking Stoves and Steel Ranges; all kinds and styles of Hard Coal, Soft Coal and Wood Heating Stoves, Steel Airtights, direct and double draft; plain and fancy cast iron and steel and iron direct draft, double draft and base burning heating stoves. Everything in stoves at prices so astonishingly low that you will be surprised and pleased.

OUR FREE CATALOGUE explains our 30 Days' Free Trial Plan, our Pay After Received Terms, our Safe Delivery Guarantee, explains our Binding Quality Guarantee, explains our plan of shipping the day your order is received, so you will only have to wait a few days; tells how we make freight charges very low no matter in what state you live. OUR FREE CATALOGUE shows an illustration of our own stove foundry, the largest in the world; tells all about why we can make prices on all kinds of stoves so very much lower than any other house.

OUR FREE CATALOGUE is the largest, handsomest, best illustrated, most interesting and MOST COMPLETE SPECIAL STOVE CATALOGUE EVER PUBLISHED and tells EVERYTHING known about stoves.

WRITE FOR OUR FREE STOVE CATALOGUE. Cut this ad out and send to us, or on a postal card say: Send me your FREE Stove Catalogue, and the big stove catalogue will go to you by return mail, postpaid, FREE. You will get the most astonishing stove offer ever heard of; you will receive a new and most astonishingly liberal stove proposition.

DON'T BUY A STOVE anywhere and tell your neighbors not to buy a stove of any kind until they first write for our New Special Stove Catalogue and get The Big Book. THE NEW OFFER OF OURS; OUR LATEST STOVE PROPOSITION. WRITE TODAY. DO IT NOW. WE WILL TELL YOU SOMETHING YOU OUGHT TO KNOW. Address,

SEARS, ROEBUCK & CO., CHICAGO, ILL.

TELEGRAPHY

Telegraphers' Penmanship and Typewriting

COMBINED IN ONE TUITION

We are unable to meet the demands of the railroads for our graduates. Positions guaranteed to all our students. Send for catalog.

The Chicago Railway & Commercial Institute
97 Washington St., Chicago, Ill.

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25c for 4 months—Cleveland, Ohio

Air Brush for Art Work

WE ARE MAKING THE STANDARD.

The best in use for applying color by a jet of air. Enables you to do better work in less time. Found in every complete studio. Circular free.

WRITE TO-DAY

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Our 24-page book free describes the greatest invention of the 20th Century, for the relief and cure of Rupture. Shows interesting photos from life and contains new and valuable information. Greatest trial offer ever made by any firm. You will be interested. Write today.

DENCE & MERY, 160 Mery Block, Toledo, O.

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ELSEWHERE OF OUR NEW BOOK

"Popular Mechanics Shop Notes"

JUST OUT

TYPEWRITERS ALL MAKES

All the Standard Machines Sold or Rented Anywhere at Half Manufacturers Prices. Shipped with privilege of examination. Send for cata'g Typewriter Emporium, 196 La Salle St., Chicago

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BILL MAGEE OF PINE NUT.

An Epic of a Nevada Mining Camp.

'Twas a dreary day at Pine Nut, and gloom was everywhere;
There was sadness in the little camp and sorrow in the air.
A more doleful set of faces one would not care to see,
The day the boys laid out the corpse of poor old Bill Magee.

'Twas pneumonia or whisky—they couldn't quite decide—
That sent the fleeting soul of Bill across the Great Divide;
But with very little wrangling over life's extinguished lamp,
They arranged a mighty funeral to advertise the camp.

I know of places where a man who shuffles off his coil
Is pitched face down with boots on in scarce a foot of soil;
But now the boys of Pine Nut said such things had had their day,
And they'd bury Bill with socks on, in the decent Christian way.

So they hired a Carson preacher, of noted funeral skill,
And agreed on forty dollars for some extra words for Bill.
There are some parsons in the land that 'd go a little higher,
But this man was no grafter but my own illustrious sire.

At two o'clock the coffin passed through Bill's wide cabin door,
With Otto Shultz and Joe Raycraft and Jackson at the fore.
Tony Kramer, with his goggles, helped to hold the coffin up,
Then followed tall Miles Johnson and his little brindle pup.

Pratt, with a Heitman flour-sack sewed firmly on his pants;
Bill Peckham, Baldy Adams, Lew Stevenson, Old Nance;

And loomin' up ahead of all, the big long-bearded Zern,
All headin' toward the bourn from which no travelers return.

They finally reached the grave that yawned beneath a spreading tree,
The parson told how pure had been the life of Bill Magee;
And as they heard the kindly things the clergyman had said,
They almost thought that angel's wings was sproutin' from the dead.

They lowered the coffin down with hands as steady as a clock's,
And then began to shovel in the gravel on the box.
When suddenly they stopped the work. Somebody hollered "Whew!"
And then a golden nugget came a-flashin' into view.

Joe Raycraft, straddlin' o'er the grave called out, "I locate here;"
And then Lew Stevenson gave Joe a swat upon the ear;
Next Johnson jumped aboard of Lew in a most decided way,
And then the savage brindle pup plunged headlong in the fray.

Then Baldy Adams pulled his gun, and Billy Peckham his,
And in 'bout a half a second the lead begin to whiz.
For several humming minutes it was a fearful fray,
With all upon the ground before the smoke had cleared away.

The parson, when he heard the shots, whipped up his old gray mare,
To find the coroner and send that functionary there.
When that official reached the spot, immediately did he
Tack a location notice on the headstone of Magee;

Remarkin' to the wounded: "I regret you can't agree.
I'll record these placer diggin's and consider it my fee."
And so before the sun was down the records was complete,
All in accordance with the law at Douglas county seat.

And now that thrifty coroner, as many are aware,
Is livin' off that placer claim, a multi-millionaire,
While the parson oft has mentioned, confidentially to me,
From that eventful day to this he never got his fee.

—Sunset Magazine.

HOW TELEPHONES PAY FARMERS.

Eggs are high in Indiana. Claton B. Hunt, one of the oldest and largest produce dealers of Indiana, gives part of the credit to the telephone for the better prices farmers now receive for eggs and other farm products. He says: "When a huckster drives his wagon up to the home of a farmer and offers a price the farmer need not take the huckster's word. He steps to the telephone, calls up the town dealer, learns the price and sells his produce without fear of being beaten."

CONSOLATION.

We approached the Czar.

"You do not seem worried because the Russian fleet is bottled up?" we interrogated.

The Czar smiled a wan smile.

"My dear friend," he said, slowly, "don't you know, our ships are like wine; the longer they are bottled the better."

THE WINGET CONCRETE BUILDING BLOCK MACHINE

Straight & Corner Block

Automatic Adjustable

Makes any size or shape block required in ordinary building operations

A. D. MACKAY & CO., Chamber of Commerce, CHICAGO, ILL.

LOW PLUMBING BILLS

Get them by paying right prices for supplies. We sell

SUPPLIES AT WHOLESALE

You save 20% to 40% on every article. Highest grade goods and line complete. Free illustrated catalog gives all particulars. Write for it.

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229 W. Harrison St., Chicago.

ELECTRIC LIGHTER

For Gas and Gas Ranges

A perfect, safe, economical lighter. Saves its cost in matches

No Household Should be Without One
The only really successful lighter on the market.

PRICE, DELIVERED IN CHICAGO, $1.25

To any part of the U. S. or Canada, Shipment Prepaid, $1.50. AGENTS WANTED. Address

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Write for our plan by which you can earn

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BIG PAYING BUSINESS
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Write for names of hundreds of delighted customers. Make $80 to $60 weekly. Do business at home or traveling, all or spare time, selling Gray outfits and doing genuine gold, silver, nickle and metal plating on Watches, Jewelry, Tableware, Bicycles, all metal goods. Heavy plate. No experience, quickly learned. Enormous demand. No toys or humbug. Outfits all sizes. Everything guaranteed. Let us start you. We teach you FREE. Write today. Address,

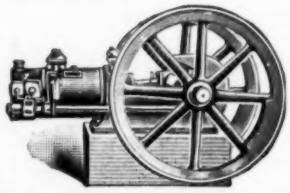
H. GRAY & CO., Cincinnati, Ohio.

KEROSENE OIL ENGINE

Stationary, Marine, Portable. Send for catalog
Int'l Power Vehicle Co., 381 Dearborn St., Chicago

OUR EXHIBIT at the St. Louis World's Fair

consisting of **17** Gas and Gasoline Engines, **11** of which are piped up and running, is the largest, most comprehensive and most attractive display in this line ever made.

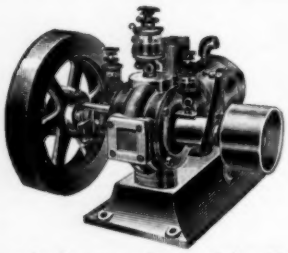


Our friends will find at the space good drinking water, electric fans, comfortable chairs and writing materials. Visit us, see our exhibit and test our hospitality.

The OTTO GAS ENGINE WORKS, Philadelphia, Pa.

CHICAGO: 360 Dearborn Street MINNEAPOLIS: 318 3rd Street OMAHA: 1108 Farnum St.

SMALL GASOLINE ENGINES



Latest
Simplest
Cheapest
Best

Our new type 1 h. p. gasoline engine has no equal; suitable for all purposes where light power is desired. Starts instantly and runs until you stop it. Has automatic governor; runs at varied speeds.

MAKE YOUR OWN ELECTRIC LIGHT

For residences and small individual isolated plants.
Finest electric light cheaper than kerosene. No combination lighting outfit such as we offer, has ever before been placed on the market.
Price within the reach of all. Send for full descriptive circulars.

Martin Mfg. Co.,
180 W. Madison St.,
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GAS and GASOLINE ENGINES

...1 H. P. to 125 H. P...

DYNAMOS & MOTORS
½ to 400 H. P.

Complete Lighting or Power Plants for individual uses, large or small, including Engine, Dynamo and Switchboard. Tell us your requirements.

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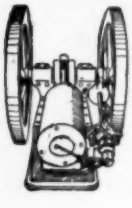

Gasoline Engines

"HONESTY IS THE BEST POLICY"

THIS IS OUR POLICY

LET US PROVE IT TO YOU

Send for Catalogue. Engines 1 to 500 H. P.

CAVANAUGH & DARLEY
25 West Randolph Street, Chicago

LIFE MASKS PREVENT DROWNING.

A life mask has been invented by a German who says many persons who can swim are drowned when wrecked or accidentally thrown into the water, by the waves dashing in their faces. A life preserver must be worn also, and the mask has valves which keep the water from the face but respond to suction readily, enabling the wearer to breathe.

DRY METHOD FOR DEGREASING WOOL.

A new method of degreasing wool and machinery for the same have lately been patented by a German, writes United States Consul Pike, of Zittau, Germany. Infusorial earth is applied to the wool by a current of air and absorbs the grease and cleans the wool evenly throughout. Skin wools are now cleaned with strong alkalies, and the new method will be a great improvement in that the dyes take better where the alkalies are not used.

THE COMPRESSION OF WATER.

Water is so nearly incompressible that it is customary to consider it absolutely so. Professor Toit, however, informs us that were the water in the lower levels of the ocean relieved of the weight above it—i. e., if the sea water were not compressed by its own weight—the level of the sea would be 116 feet higher than it is. Were this true some 2,000,000 square miles of what is now dry land (4 per cent of the land surface of the globe, and in many respects the most valuable portion) would be submerged, and most of the greatest cities on the globe obliterated, including New York, London, Philadelphia, Paris, St. Petersburg, Constantinople, Canton and Tokyo. The present habitations of some 100,000,000 of the inhabitants of the globe would be engulfed.

IT CURED HIM.

A sad-looking man went into a drug store and asked the druggist if he could give him something to drive from his mind thoughts of sorrow and bitter recollections. The druggist nodded, and put him up a mixture of quinine and worm-wood and rhubarb and epsom salts, with a dash of castor oil, and gave it to the man; and for six months he could not think of anything except new schemes for getting the taste out of his mouth.

WILL DISTILL ALCOHOL FROM PEAT.

At Reedsburg, Prussia, a distillery is being erected at which alcohol will be distilled from peat, reports S. P. Warner, consular agent at Gera, Germany.

Alcohol can be distilled from peat so much more cheaply than it can be distilled from other substances that the company expects to sell it for fuel.

"Want" and "For Sale" Ads. 2 cents per word, payable in advance. Replies may be sent to a number, care Popular Mechanics, and will be forwarded promptly without extra charge.

AUTOMOBILES.

FOR SALE—Haynes-Apperson 1902 phaeton, 12-h. p.; thoroughly overhauled and now at factory. As good as new. A fair offer accepted. Have bought touring car same make. J. B. Price, Hazleton, Pa.

FOR SALE—Automobile gear, fine shape, equipped with new tires. C. C. Hollenbach, Columbus, O.

TWO-CYLINDER, 10-12-h. p. French automobile engine in good order, for sale. T. H. Ludwig, 80 William St., New York.

FOR SALE—Buffalo runabout, good shape, $250; 14-in. boiler, $30; boiler shells, $8, all drilled with head and seamless shell; set 28x2½x3-in. wheels, $10. Running gear and body and 3-h. p. auto engine. Box 523, Meyersdale, Pa.

$399.00 WILL BUY a steam automobile. Carries four passengers. Just the thing for rural mail route. C. A. Wardle, Oak Park Ill.

CASTINGS FOR BICYCLE ENGINES. 1½ h. p., $7.00; 2 h. p., $12.00; 3½ h. p., $12.00. W. Hoffman Motor Works, 1253 N. Halsted St., Chicago.

AUTOMOBILE PARTS at half price. Complete outfits. Bargains to small builders. C. C. Hollenback, Trustee, Columbus, O.

FOR SALE—2½ h. p. motorcycle; used 4 months; tires first class. A bargain at $60. F. Norton, Humboldt, Kan.

FOR SALE—Thomas motorcycle, in fine shape, for sale cheap, or exchange towards auto. One 4x5 Cycle camera and tripod; bargain. A. B. Elliott & Son, Chenango Forks, N. Y.

FOR SALE—French Decauville gasoline runabout, 6 h. p., double-cylinder engine, two speeds, Michilen tires, complete, in good order. Sacrifice for $250, cash. Bargain. Flatow, 603 E. 9th St., New York.

FOR SALE—$450—Covert gasoline runabout, good as new, or will trade in for a larger car. Fred Fadum, Baltimore, Md.

FOR SALE—Second-hand Whipple motorcycle, used less than one month; price, $75. Also 2 h. p. Mitchell at $100. Also Merkel, $100; but little used, in perfect running order.

FOR SALE—New and second-hand gasoline engines.

New prices: 1¼ h. p. air-cooled $40
New prices: 2 h. p. air-cooled 60
New prices: 2¼ h. p. water-cooled..... 75
New prices: 3 h. p. water-cooled..... 95

The above air-cooled engines are ideal for use upon motor bicycles, etc. The water-cooled for motor vehicles, motor boats, shop and farm use. We occasionally have second-hand engines of all of above sizes at close prices. Have now a double cylinder 5 h. p. marine water-cooled engine; price, $90. WHIPPLE CYCLE CO., 1260 West Jackson Blvd., Chicago.

BLACKSMITHS.

Be a Master Mechanic and expert steel worker by using Toy's Treatise on new steels explaining how to work them with 75 new methods for working all difficult jobs. Ten receipts for making your own compounds for welding different kinds of steel solid. Thermite welding fully explained; also two colored tool tempering charts; chart A explains all annealing and hardening. Chart B explains both scientific and plain tempering to a standard. All the above for $1.00. Valuable samples free. W. M. Toy, Sidney, Ohio.

ENGINES

"SHOP NOTES"—Cloth $1, paper covers 50 cents. Popular Mechanics.

FOR SALE—Engines, gasoline. From one to eight h. p. All new. Simplest engine made and very cheap. John Fox & Co., Covington, Ky.

FOR SALE—12 h. p. horizontal boiler; 75 h. p. gas engine. Trip hammer. Hathorn Foundry & Machine Co., Mason City, Ia.

FOR SALE—Have 7 h. p. genuine alco-vapor engine, used three short seasons. Completely overhauled last fall; absolutely perfect condition. Sell complete with every necessary detail. Price very reasonable. Have got speed fever, putting in big engine. Stebbins, Short Beach, Conn.

DRILL PRESS—15-inch, with set of twist drills 17-32 to 1 inch by 32ds; drill chuck for straight shank drills to ⅝ inch; for hand and power, $22; without power, $20. Enclose stamp. J. Homer Boals, Salineville, O.

$5 CASTINGS SMALL LATHE. 24 INCHES LONG: 10 cents stamps for print. Chas. W. Stearns, P. O. Box 224 Mansfield, Mass.

BUILD YOUR OWN STEAM ENGINE—We have the castings, 1, 2, 3, 4 and 6 h. p. vertical, for marine or stationary use. 1, 2 and 3 h. p. sizes can be built on a 10-inch lathe, except boring the flywheel, and we will do that when so ordered, or any machine work at reasonable prices. Send stamp for circular. Salineville Model & Machine Works, Salineville, O.

ENGINE CASTINGS ¼ to 6 H. P. You can build our 3 H. P. engine on a 10-inch lathe except boring flywheel, this we will do when so ordered, or any part of the machine work at reasonable prices. Salineville Model & Machine Works, Salineville, O. (Enclose stamp for circular.)

FOR SALE—50-h. p. gas engine. If interested, address Hoosier Sweat Collar & Mfg. Co., Indianapolis, Ind.

WESTINGHOUSE DYNAMO, 60 light, second hand; ½ h. p. automatic engine, new; set ratchet pipe stocks and dies, ¾ in. to 2 in., and small set ⅛ in. to 1 in., $5. Some electricians' tools and supplies. Pipe taps 1 to 2 in., $2.40. Electrical Books, five vol., new, $3. J. Homer Boals, Salineville, O.

GAS BALLOONS bought, sold, made; any size. Carl E. Myers, Supt. Aeronautical Dept., St. Louis, Mo., Exposition. Address with stamp, Balloon Farm, Frankfort, N. Y.

Five years subscription for three dollars. Popular Mechanics Co. make this offer. A great many people are taking advantage of it. It's open to you also.

BUSINESS CHANCES.

FOR SALE OR EXCHANGE—$18,000 stock of general merchandise. Cash sales last year, $70,000. Daily cash sales now $250 per day. Will take good Illinois farm. Best of reasons for selling. Address, 765 Popular Mechanics.

FARM PROPERTY.

FOR SALE—Illinois farm; 323 acres; black rich bottom land; clay subsoil; all can be plowed; no better corn land in the state; good buildings; fenced and crossed with Page woven wire; rural free delivery; long distance telephone; good gravel roads to city of 2,500 population. Home market for all farm products. Borden's Condensed Milk Factory. The price paid for milk for past six months, $4.50 per 100 lbs. Good school and creamery one-half mile from farm—6 miles northwest of Chicago. If sold quick will take $80 per acre. Part cash. Address, 766 Popular Mechanics.

SUMMER HOMES.

WISCONSIN SUMMER HOME—On the shores of beautiful Green Bay. An artistic 10-room log lodge. Has not its equal this side of the Adirondacks. Accommodations for twelve or more. Huge fireplace, waterworks, large porch and living rooms, kitchen, dining and bed rooms. Unsurpassed for ladies and children. Safe bathing, boating and fishing. Completely furnished (except bedding) to move right into. Any one desiring a summer home will find it perfect. Very reasonable; cash or trade. Address A. D. G., Popular Mechanics.

SPECIALTY MANUFACTURING.

WANTED—If you have anything in light-metal manufacturing, job or experimental work, write me for lowest prices, Geo. W. Dickey, 1103 Osgood St., Chicago.

POSITIONS WANTED.

YOUNG MAN, studying correspondence course, wants situation as apprentice in drafting room so as to acquire experience in mechanical drawing. Address Box 810, Popular Mechanics.

WANTED—Position as manager or assistant of general store. Moderate salary. Twelve years' experience in successful business. Best of references as to character and ability. Address 1904, Popular Mechanics.

WANTED.

WANTED—Marine gasoline engine; must be cheap. 4, 6 or 8 h. p. Dr. Schmidt, Covington, Ky.

WANTED—Young men to learn Telegraphy and R. R. Accounting. Our graduates receive from $50 to $150 per month. Endorsed by all railroads. Write for catalogue. Morse School of Telegraphy, Cincinnati, O., Elmira, N. Y., La Crosse, Wis., Atlanta, Ga.

EXCELLENT SIDE LINE—My guarantee sells it. Agent's outfit and two 25-cent packages by mail, only 10 cents. Nothing like it. G. W. Mitchell, Dept. P, Kennett Square, Pa.

HELP WANTED.

WANTED—A sober young man to learn the blacksmith trade; must not be afraid of horses. One with a little experience preferred. A good home for the right young man. John M. Park, New Concord, Ohio.

ONE MECHANIC in every shop to earn good money. Address "Money," care Popular Mechanics.

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The lumberman measured the empty shelves carefully, and wired to one of his newspaper friends in New York: "Ship me a hundred sixty-seven running feet of books for library."

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THE WHITE SPARROW.

It is an old fable, about a farmer whose place was going to ruin, and who, on consulting a friend, was told that there was but one hope for him and that was to see the "white sparrow." His adviser also told him that the white sparrow was only to be seen very early in the morning. The farmer, who was rather a superstitious person, at once began to get up early every morning and look about his place, trying to find this curious bird.

The first morning he discovered that his milkmaid was in the habit of getting up very early and giving away to the neighbors, or selling for her own benefit, a bucket or two of fresh milk, after she had milked the cows. The second morning he discovered something else that was done wrong, at his expense, and so on each morning he found out some point which needed correction.

Finally after a month or so, his farm began to improve and he also began to find that he was saving many things which heretofore had been a loss to him.

His friend then asked him if he had found the white sparrow, and he replied no; that it was not necessary to find the white sparrow now, as by getting up early he had found out how to change the course of things so that his farm was already in a satisfactory condition.

It is this way with every manager. If you come late and go home early, there are many things which will escape your attention that it would be very profitable for you to know.

OYSTER RAISING IN HOLLAND.

In Holland oysters are grown in shallow pools, through which the salt water is permitted to flow freely, says an exchange. A series of these pools is called a park. The most important part of the work is done in April, when the oysters spawn. It is then that the "collectors," curved tiles about a foot long, covered with a layer of mortar, are placed in the parks. The spawn floating about in the water attaches itself to the collectors, and is then gathered into boxes 8 feet by 2 feet and immersed in the beds. In August the "collectors" are taken out for "cleaning," an operation performed by women. In the autumn they are again removed from the water, the young oysters now being the size of a 25-cent piece and strong enough to live alone. A special kind of scissors is used to take the oysters off. The tiles, with their living excrescences, are placed in the middle of a table, around which gather men and women. The latter are more dexterous than the former in performing the operation. Considerable skill is required, as there is danger of puncturing the thin shell and injuring the young oyster. Notwithstanding the care exercised, the loss is from 20 to 25 per cent.

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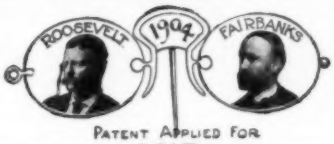
Roosevelt 

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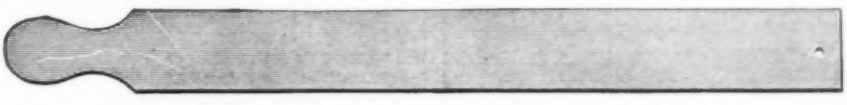

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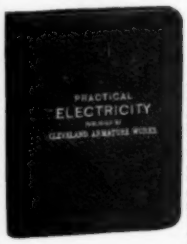

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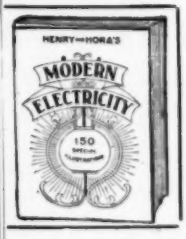

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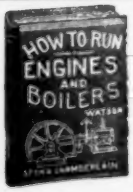

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THE MASTER OF PARAMOUNT AND HIS UNDOING.

By Walter E. Andrews.

There must be some way out of this mess," growled the colonel to himself, impatiently. "I believe the boy is innocent, and if I had only the ghost of a clew—anything to hang a thread on—I'd——"And he scowled fiercely at a bust of Blackstone over the office desk. At last he could no longer endure his own thoughts. "I'll go out and see Flora Maitland," he muttered. "I've an idea that she loves Jack. Two heads are often better than one, and perhaps she or her woman's instinct can think of something. Anyhow, I'll go."

In ten minutes he was behind a fine pair of bays, speeding out of town toward the Maitland farm. The sun shone brightly, the Michigan air was pure, and the colonel expanded his chest like an old war horse.

On sped the splendid bays, past Paramount farm with its fine house and grounds, past the orchard home where Jack Remington had lived previous to his arrest on the serious charge which now confronted him, and then a mile farther on, straight to the Maitland home. There the team stopped.

"I've come," announced the colonel to Miss Maitland, "to be cheered up. And to ask your advice about—well, about Jack." A faint tinge of color crept into her face. "I call him Jack," he softly added, "because I love him. You may call him Mr. Remington—if you wish."

For a moment she hesitated. Then, the color deepening in her face, she said simply and shyly: "Let me call him Jack, too."

"Bravo! Now we understand each other and are prepared to fight."

She gave him a puzzled look.

"You and I must fight for Jack's life and honor! We must prove that we are worthy to—to call him Jack. We must think, plan and conspire for him." His eyes seemed to burn her face. "You are a woman, with a loving woman's instinct," he continued. "I'm a plain old lawyer, with simply a faculty for reasoning—putting two and two together. But I can't jump at conclusions unless I can see some place or somebody to jump at, and I can't reason without material."

For a moment he paused. Then he added, earnestly, almost fiercely: "The prosecution bases its case on the fact that Somers spent the fateful evening at Jack's house, and that his body was found on Jack's land. We, for the defense, are working in the dark, without a contrary clew or even a suspicion. What we need is something to start on—a hint—the merest trifle pointing toward another man. But there is nothing! * * * Have you no instinctive feeling which can be of help? Does your heart give no hint to help the man you love? Think! think!"

His emotion and suppressed excitement startled her. They were old friends, but she had never seen him so moved, nor had she until that moment realized the depth of his love for Jack.

"I—I hardly know what to say," she faltered.

"Say what your instinct whispers. Who do you think could have done—what Jack never did, I'll swear?"

"Who?"

"Yes; whom do you mistrust in your own secret thoughts and your own heart? Is there anyone?"

"Yes—perhaps—I am not sure."

"Who is it?"

"Mr. Worthington," and she glanced apprehensively around the room.

"James Worthington of Paramount Farm?"

"Yes."

"Impossible!"

"Why?" Her courage returned, and she met his eyes bravely.

"Because there is no motive; Worthington is rich; and, I believe, he did not even know poor Somers."

"Perhaps—but he hates Jack."

"The dickens he does!—excuse me—why?"

"Because he—he wanted me to marry him, and I preferred—some one else," and again the color crept into her face.

This was news, indeed.

"Then why didn't Worthington kill Jack instead of Somers?" demanded the colonel, still incredulous.

"I do not know—I'm sure of nothing; I feel only an unreasoning fear and dread of him. I can't account for it, or reason it away. I feel that he has an evil heart without knowing why."

Their eyes met; the colonel became, in spite of himself, less incredulous.

It was close to four o'clock when he stepped into his buggy and turned toward home. Again the gallant bays sped over the road, but the exhilarating motion failed to arouse him from a thoughtful reverie. Nearing the great gateway leading to Paramount Farm he woke with a start, and turning into the gateway, drove up the long avenue of stately trees. But even then he muttered something about "a wild goose chase" and "women's foolish notions."

Nevertheless, he drove steadily on and soon arrived at the house. Pete came out to take the horses. Pete and the colonel were old friends.

"Master home, Pete?"

"No, sah."

"Where is he?" demanded the colonel.

"Gwine to Grand Rapids. We's all alone."

"Back soon?"

"'Bout 'leven days, sah," and the darkey grinned pleasantly.

"Well, I want a book, Pete, so I'll go into the library and help myself. Here's a quarter—catch! Now don't disturb me, for I shall want to read a little, perhaps. Take care of the horses."

Pete did catch—quite skillfully, and grinned again until his back teeth were endangered. The quarter entered his pocket and the colonel entered the house simultaneously.

The colonel had been there before, for he attended to the law business connected with Mr. Worthington's estate, and so the magnificence of the house was nothing new to him. The great hall with the stately furnishings, the luxurious parlor and the library with its long rows of books, were familiar sights. But even a stranger could have seen that the library was the master's favorite room—the place where he really lived. Every man has his own pet room, or his own pet pipe, or his own pet hobby. Mr. Worthington's hobby was evidently science, as evinced by the numerous scientific instruments and electrical appliances scattered around the library. Dust was over everything, and order there was none. Perhaps the master, being in love, had become neglectful of his old favorites; at any rate, as Peter once told the colonel in an awe-struck voice: "Massa's berry 'tickler 'bout dese t'ings—nebber let Pete dust dem or touch dem. He say dey berry dang'rous—might kill Pete!"

But, as has been indicated, this was all an old story to the colonel; and yet today somehow he seemed quite interested and courious about everything. * * * Perhaps he was nervous or restless; he could not sit still. He prowled about the room, and, in fact, over many parts of the house, hunting hunting—for what? For that book perhaps. I doubt if you had asked him, whether he could have told you more than that. As he rummaged he ruminated, and as he ruminated he swore. "A blanked, undignified old fool!" was, I think, his favorite expression at that time; all of which would have astonished Pete had he been there to see and hear. But Pete, bless his simple old heart, was rubbing down the horses and singing softly to himself in his own cheery fashion.

An hour flew by. The colonel had apparently

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found the book at last, for he came out on the veranda with his hat on his head and the precious volume under his arm. He whistled. Peter soon brought the rig around, and the colonel stepped into the buggy, calm and dignified, but strangely white.

"De co'nel read too much," said Peter to himself as he gazed after the flying team fast disappearing down the avenue; then with a shake of his woolly old head he forgot all about the subject and went singing back to his work.

* * *

The great trial was on. The prosecution had presented its evidence, and matters looked dark for the prisoner. As Colonel Walters arose—calm, impressive—there was intense silence in the room. A human life hung on his words; on his knowledge and skill. His great reputation caused some to doubt the result—but could any human skill, any human knowledge throw down the terrible mountain of evidence piled up against the prisoner? * * * The surging tide of humanity in the court-room held its breath—and waited.

Miss Maitland was there, pale, expectant, her brave, sweet eyes never leaving the prisoner's face. He, too, was pale; from long confinement, perhaps, or, as some said, perhaps from a guilty conscience. Be that as it may, his dark eyes unfalteringly met the sweet, blue eyes of the girl he loved. Did she love him? he wondered. Ah, if he only knew!

Several witnesses were called, all neighbors of the prisoner and all testifying to his previous good reputation. * * * Was that all the defense had to offer? A surprised, disappointed look passed over the faces of the spectators. The prisoner seemed to turn a shade whiter and even the colonel looked disturbed.

"Call James Worthington," he said.

A tall, gentlemanly person with piercing black eyes, irreproachably dressed, irreproachably groomed, and with an inapproachable air of distinction and wealth—and yet, somehow, not a healthy nor a happy looking gentleman—walked to the witness chair.

The colonel took him in hand listlessly. "You are the prisoner's nearest neighbor?"

"Yes."

"Has he been a good neighbor to you?"

"Yes."

"You were at home the night of the murder?"

"I was."

"Reading and studying in your library, perhaps?"

"Yes—I generally am"—with a smile.

"Just so," continued the colonel carelessly. "And the servants?"

"They were away at a dance that night."

"Then you were alone in the house"

"Yes."

"Were you acquainted with John Somers?"

"No."

"If he left Mr. Remington's farm that night and started for town, he must have passed your home some time during the evening?"

"If he did—yes!"

"And you saw nothing of him?"

'Certainly not."

The colonel looked bored and seemed about to drop the subject as hopeless. But after a moment's careless hesitation, he continued:

"You formerly lived in England, I believe?"

"I did—several years ago."

"In what part of England?"

"Birmingham."

"So did John Somers," said the colonel. Judge and jury looked surprised. Mr. Worthington no longer smiled.

"You are interested in scientific matters?" continued the colonel indifferently.

"Somewhat."

"You have telephones, X-ray machines, phonographs,

electric batteries, and other such things in your library?—I am something of an experimenter myself, and I can appreciate your tastes," added the colonel genially.

"Yes, I have such things—what of it?" and the smile reappeared.

"Nothing much, except that I'd like to make a little experiment now—with your assistance and the court's permission." So saying, he walked to a table and, quietly removing a cloth, exposed to view a large-size phonograph fitted with an exhibition sound amplifier. Then his careless manner instantly vanished, and, as he straightened up to his full height, the witness, the court and the jury were alike thrilled with surprise and an unaccountable feeling of—awe.

"Gentlemen!" rang out the colonel's voice, "it has been said that nothing but a miracle can save my client. I shall now call upon science for that miracle. * * * The cylinder in this phonograph is one taken from a similar machine in Mr. James Worthington's library. The cylinder was there the night of the murder; the recording apparatus of which it was then a part stood on a table; only a touch and a voice were lacking.

"Mr. Worthington, also, was there that night—as he has told you. But alone? No! A gentleman from Birmingham, England, who had been spending the evening at Jack Remington's farm, stopped on his return to town—stopped to see a scoundrel he had long been hunting and to demand vengeance for a ruined home! * * * Taken by surprise, yet ever ready, a revolver bullet was Worthington's answer, and, leaving a dying man on the library floor, the murderer fled in momentary terror. When he returned, sobered by the calm night and fortified by a villainous plan to shift the deed on a neighbor—the man who had borne the name of John Somers was dead.

"But before the unfortunate gentleman died a strange thing took place in that lonely room. * * * Sense returned for a moment—the thirst for vengeance still lived; strength revived, and—God only knows how—he raised himself to a table above him and recorded his last breath on the cylinder of the phonograph there. * * * Do you doubt it! Then listen to his dying words—you knew him—listen!"

With a quick motion the colonel touched an electric button. Through the deathlike stillness of the court-room there came creeping awful words of terror, anguish and accusation—the unmistakable voice of John Somers.

With a cry that vibrated through the building, the master of Paramount sank on the floor, and then lay still. Strangely still. The court-room was in confusion. Men shouted and swore. Women wept and fainted.

"Heart failure," said the doctors.

"Retribution!" said the awe-struck spectators.

What said the blue eyes? The brown eyes questioned and looked again. The message was there—faltering, timid, yet unmistakable. "Courage. * * * I love you. * * * All is well!"

Then court adjourned.—Philadelphia Inquirer.

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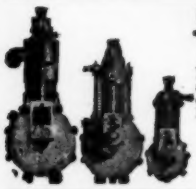

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CIVILIZATION.

In his home beyond the sea,
  A Jap donned trousers gay,
In the place of robes de nuit,
  Which he used to wear all day.
Then he learned to shoot with skill,
  And the Powers, much surprised,
Watched his bullets maim and kill,
  And remarked: "He's civilized."

On the shores of Baffin's Bay,
  Lived a little Esquimau,
Who made up her mind one day
  To be otherwise—and so
She squeezed her pretty waist
  In some corsets, undersized,
Which she then securely laced,
  And remarked: "I'm civilized."

By a tropic mountainside,
  A Zulu cursed his fate,
Then assumed a foreign stride
  And imbibed some whiskey straight,
He put on a narrow shoe
  And he never exercised,
So he got dyspepsia, too,
  And remarked: "I'm civilized."

By the ancient Chinese wall,
  Once a Manchu ran a race
With a Russian cannon ball,
  And collided face to face
With a bombshell Japanese,
  By which he was capsized;
And his friends (ascending trees)
  All remarked: "He's civilized."

T. Ybarra.

MOTOR CAR WAS FIERCE.

The following recently appeared in a little weekly paper, published in a small town in Ireland, says the Dublin Motor News. It seems motor car tourists had just taken a notion to travel that way, and this is how they looked to the editor:

"The cloud no bigger than a man's hand now will develop into a raging tempest. Then let him that heeds flee to the mountains where petrol stations are not, and woe to him that hath a puncture in those days. For following close on the heel of the cloven hoof now appears Beelzebub himself,

A hundred horse-power,
A hundred miles per hour,
The hooter hooting,
The people scooting,

scattering fumes of petrol and methylated spirit, and with the moving beam of a searchlight, deadly as eye of basilisk that killeth at a distance."

BIG PAY FOR BOY'S PERILOUS WORK.

A boy in Dayton, O., is earning $4.75 every day carrying a water pail for the workmen erecting a skyscraper. More than 100 feet above the street he runs about on the slender iron beams with the pail and cup, to refresh the men. The other day he met a workman on the same beam. This beam was probably not more than six inches wide, and the water boy stopped long enough for the workman to take a drink. The two stood poised in the air 100 feet or more from the paved street, and when the workman finished his drink, the water boy backed up from the way he had come, while the workman advanced, and when they reached a point where they could pass, the workman went on to another part of the building. The water boy tripped gaily along, running and sometimes almost sliding from one upright to another, with nothing under him but a six-inch foothold to save him from a terrible fall.

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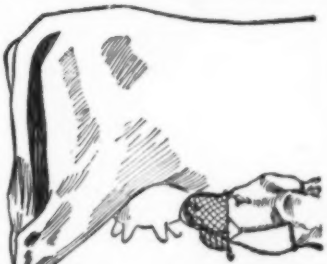

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The causes of trains thus parting are due largely to the present method of handling freight trains. In order to reduce the number of engines and train crews, trains are made up of from 40 to even 80 cars, where a few years ago they were only 20 to 30 cars. The longer the train the greater strain on the drawbars of the cars nearest the engine. Many of the cars still in use were built 15 years ago, while the locomotives have constantly grown in weight and power, having increased from 50 and 60-ton engines to 90 tons up to 110 tons.

In making up his train the yardmaster endeavors to get the old cars at the rear end, but cannot always do so.

M. V. Quinn, conductor, in a paper before the St. Louis Railway Club, said:

"I find to release the brakes at slow speed without the proper resistance on the engine or head cars will also cause train to part, the air releasing on head car first and causing head end of train to jerk rear end and very frequently pull out drawbar on break knuckle. To overcome this, all engines in road service should be equipped with retaining valves which should be used while releasing at slow speed. In case engines are not so equipped and are required to slow down to a speed of eight miles per hour, the train should be brought to a full stop, or the trainmen should set up four or five retainers on head end of train, or at least set four or five hand brakes, which will keep train bunched until air releases on rear end of train."

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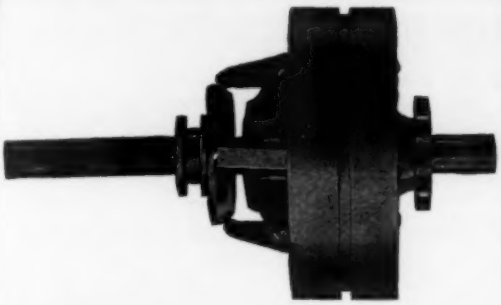
Jellinect, a noted German authority on motorboats, says: "I am quite sure that within a few years motor boats will be built which will be speedier than our fast automobiles. It is true some have claimed the power of resistance of the water is so great that it will not be possible to make boats to go so fast as motor cars. Well, the same argument was used for years in the discussion as to the probable limit of speed of ocean greyhounds; they tried to demonstrate with figures that they would not be able to travel faster than 19 miles per hour. At present some have shown a speed of nearly 27 miles. So you can draw your own conclusions as to the possibilities for speed in motor boats."

A WESTERN EPITAPH.

Here lies the form of Ezra Hurst,
An Indian cut his hair;—
Cut his hair off, bottom first—
'Twas more than Ez could bare.



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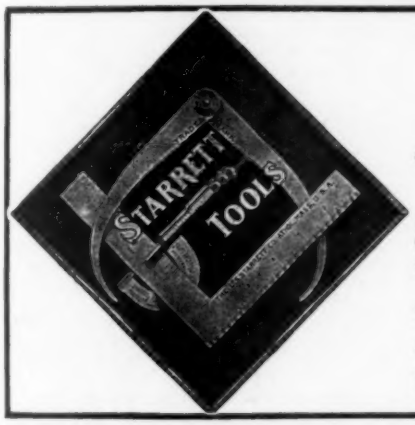

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HOW VALUABLE INVENTIONS WERE STOLEN.

The history of the conception, development and final success or loss of inventions which were worth millions, would make a stranger and more fascinating story than any romance ever penned. The Technical World says:

The scene of one of these stories is laid in the wild moorland country around Sheffield, England, where a watchmaker named Huntsman had built a factory for making steel by a process of his own invention. The secret was a very valuable one, for it was the only process by which steel could be made of uniform quality throughout; but Huntsman had little fear that any of his rivals would discover it, for he employed only picked and sworn workmen, and the portals of his factory were almost as strictly guarded against strangers as the doors of a bullion vault.

However, one bitterly cold wintry night, when the wind was shrieking over the neighboring moor, driving the snow in wild eddies before it, a tattered, shivering tramp presented himself at the door of the works and pitifully craved permission to warm his frozen bones at the furnace fires. For a long time he pleaded in vain; the doorkeeper was obdurate; but finally importunity and the pathetic aspect of the man won the day, and the tramp was admitted to the warmth, only to fling himself on the floor in utter exhaustion and to fall asleep.

The rascal, however, was sleeping with one eye open, and with that eye he was craftily watching the men at their work, with the result that when an hour later he left the place with words of gratitude, he took Huntsman's secret with him.

Another interesting story takes us to the neighborhood of Temple Bar, in London, and to the shop of a chemist who was the only man in England that knew the secret of the manufacture of citric acid. So jealous was he of his invention that he would share it with no one, but worked alone in the laboratory over his shop in Fleet street.

One evening, however, when his processes were well advanced, he locked up his laboratory and left the premises for a time, assured that no one could possibly gain admittance during his absence. But he bargained without a certain uninvited guest who worked his way down the chimney into the laboratory and made such good use of his time that when he re-emerged from the chimney he had the manufacture of citric acid at his fingers' ends.

WAS SAVING THE CRACK.

Billy was operating a locomotive in the capacity of engineer and Mike was firing for him. Mike was ambitious and often looked the locomotive over to find out if anything was wrong with it. Just about Christmas one year Mike crawled down around the engine and came out, very officious, and said, "You have got a crack in your truck wheel," and the engine was taken out of service and Billy missed the run out, but he got Mike in a corner and said, "You blanked idiot, what did you go poking around that wheel for? I was saving it for Christmas for a lay-off."

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COWS ELECTRICALLY MILKED.

Cows are now milked at many large dairy farms in Germany by means of electricity. Rubber hoods are attached to the udder of the cow and these hoods are connected with a vessel for receiving the milk by means of a rubber tube, from which an electrical device exhausts the air. The suction so secured closely resembles the sucking of a calf and the milk flows more freely than when the milking is done by hand. Absolute cleanliness is secured where the electrical method is used.

WHERE SHELLAC COMES FROM.

Few people know that lac from which shellac is manufactured is an incrustation left on the branches of certain trees by insects in India. All Indian provinces produce it but principally the Central Provinces, Bengal and Assam. In other districts local dealers use it for making rings, beads, bracelets and other ornaments and also for wood laquer work.

The lac is collected by the jungle tribes, who break off branches on which it is deposited. In this form it is called stick lac. Manufacturers of shellac and button lac buy large quantities of it in this form and put it through the processes which prepare it for commerce. The United Kingdom and the United States are the two great markets for it.

Shellac has been used in electrical works and in making gramophone records of late and as the demand has exceeded the supply, the price is considerably higher, says Consul-General Patterscn of Calcutta, India.

AMAZON REGION THE GRAVE OF BRIGHT EXPECTATIONS.

Many fabulous stories are told of the country stretching far on either side of the Amazon, that mighty stream that flowing though a series of mouths 180 miles wide stains the ocean for a distance of 600 miles. United States Consul Aymé, of Para, Brazil, however, in a recent report refutes these stories and says that the great matted swamp forests do not contain the endless succession of valuable products imagined by many persons and that there is nothing in the region for young men of enterprising spirit and a few thousand dollars capital.

The beautiful green fields one sees on either side as he steams up the river are only wide swamps which would engulf the flocks and herds one can in fancy see upon them; there are but two real markets, Manaos and Para, on the whole length of the Amazon. The valuable woods, nuts, fruits, oils, gums which are found there occur as rarely as diamonds in gravel or gold nuggets in streams. Rubber, ebony and rosewood trees grow solitarily, and if two are found separated by only a quarter of a mile of matted swamp forest they are considered close together. No great quantity of food is produced by the forests and a river fish and starch of dried manioc root are the principal articles of diet. Terrible, devastating, comfort-destroying insects are to be dealt with; strange languages and customs, and fevers which wreck the system. Then the would-be capitalist is ready to return home with money, health, youth and energy lost.

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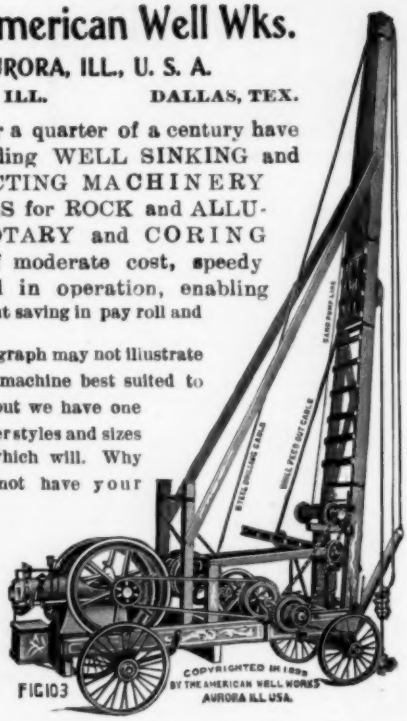

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ANNOUNCEMENT BY POPULAR MECHANICS' PATENT BUREAU.

WHAT WE CANNOT DO:

We are frequently invited by inventors to advance money to patent and promote their inventions, and reimburse ourselves from the sale of the patents. Many of the inventions so offered are meritorious and doubtless would prove profitable commercially, but we are obliged to decline all such offers for the following reasons:

First.—It requires our time and best energies to look after the patent interests of clients who pay cash for our services. It would not be fair to such clients if we gave others like service on any terms except cash.

Second.—If we became financially interested in certain patents, such interest might conflict with that of clients who have similar inventions or patents and subject us to the suspicion of protecting or promoting our own patents at the expense of our clients' interests. As patent attorneys we must be free at all times to give all clients absolutely impartial advice, and the only safe way to do this is not to have a financial interest in any patent or invention.

Third.—If we accepted some of these propositions and declined others, we would offend those whose offers were refused.

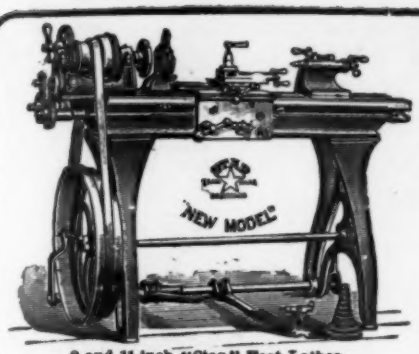
WHAT WE CAN DO:

The above offers usually come from inventors who are not financially able to obtain patents and develop their ideas commercially. At an expense of $10 inventors can nearly always place themselves in position to obtain the money necessary to patent their inventions and get them before the public. In almost every community there are business men who will advance the cash to patent and promote a good invention if they are given an interest in the patent, but they want to know that the invention is patentable and that it is likely to be practical and profitable. To find out whether an invention is patentable it is necessary to examine the patent records and see if it has ever been patented. The expense of doing this is $5.

An inexpensive test of the practicability of an invention is to have a good drawing made of it by a skilled draftsman. We can do this for you at an expense of $5, and the drawing can afterwards be used in applying for a patent, thus saving that amount on the cost of the patent. With our report showing that the invention is practical and patentable, an inventor can go to any one with a business-like proposition, and there are few communities where he will be unable to raise the money necessary to obtain a patent and make a sample or model of the invention so that it can be placed in good shape before manufacturers or others interested. Usually the drawing which we furnish is alone sufficient to prove the practicability of the idea. These steps must be taken by the inventor at his own expense if he wishes to secure financial assistance for the patent and other expenses. If the inventor has not $10 worth of confidence in his own invention he should not expect others to invest a greater amount in it.

We are always glad to help inventors in connection with their inventions in every legitimate way. In meritorious cases we have paid inventors a commission on patent business of others which they have been instrumental in getting for us, and these commissions have enabled them to apply for their own patents. All that is necessary to earn this commission, is to send us the names and addresses of inventors, and when we obtain their patent cases we will credit 20 per cent of our fees to the party who furnishes the information.

From the above, it will be seen that any inventor who is really in earnest about getting a patent can by expending ten dollars, and the exercise



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POPULAR MECHANICS PATENT BUREAU,
Frederick Benjamin, Chief of Bureau.
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RIDING A LOG TO ST LOUIS.

This is the year of the freak journey. We hear of notoriety seekers traveling to the world's fair on foot, in all kinds of land conveyances, in skiffs, houseboats, and other water crafts, one man in St. Paul proposes to swim from that city to the world's fair city, while still another thinks he can walk on the river bed from La Crosse to the fair. But now comes the man with yet another plan.

John McCaffery proposes to start from Keokuk and make the trip to the world's fair standing upright on a log with nothing but a pike pole to assist in maintaining his position. McCaffery is 54 years of age, and is an expert employed in one of the Keokuk lumber mills. He declares he is equal to the unique trip. He figures it out that he can go from Keokuk to St. Louis in 52 hours, as the river runs about four miles an hour. The sight of a man riding down stream on a rolling, swaying log will be a novel one.

A JAPANESE GARDENER'S WISDOM.

The late Sir Edward Arnold, whose wife was a Japanese girl, told many stories of the people of the Orient, says Collier's Weekly.

"The Japanese gardeners," he once said, "have carried their art further than we have carried ours. A landscape gardener in Japan is esteemed highly. He is looked upon quite as we look on a poet or a painter.

"And these Japanese gardeners are, truly, remarkable men. I was riding with one of them near Kioto on an August afternoon and we came to a steep hillside.

"'Tell me,' I said, 'how would you plan a road to the top of that difficult hill?'

"The gardener smiled humorously.

"'I think,' he said, 'that I would first turn some cows loose and see how they get up.'"

The Grant artesian well, near Sioux Falls, S. D., throws out fish about two inches in length. The well is 850 feet deep, and the fact that the fish are not blind indicates that they came from surface water.

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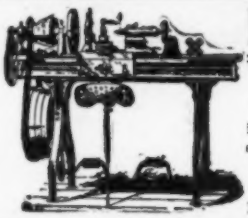

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INDUSTRY

MAGAZINE for August contains "How I Got My Automobile and Made It Pay for Itself." YOU can do likewise. How to make an Electric Telephone for fifty cents. A Valveless Gasoline Engine for automobile, boat or power, illustrated. A miniature Water Power Electric Plant. Electrical Firecrackers, and many other valuable articles, formulas, hints and helps for Mechanics, Amateurs, Students, Teachers and Business Men. Every number full of helpful PRACTICAL information. How to make Electrical Machinery and Apparatus, Gas and Steam Engines, Boats, Launches, Traps, Camps, etc. We furnish complete working drawings and instructions. Also articles on Mining, Technology, Manufacturing, etc. Fifty cents per year.

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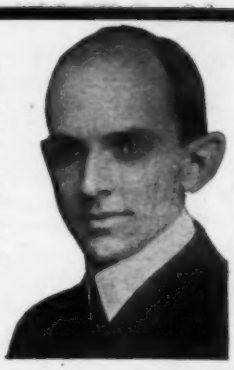

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MID-YEAR TRADE PROSPECTS.

While marked with the conservatism that always accompanies the presidential campaign, trade conditions at the mid-year stage are much more favorable than they were at the beginning of the year. The great factors entering into their fluctuations have been the Baltimore fire, a late spring, labor disturbances, the sound financial conditions now prevalent, the World's Fair and the campaign. As usual the rise and fall of hope have depended on the farmers. The outlook for crops is now fine and at this late day is not liable to any serious change. In speaking of trade prospects The Keystone says:

"It is generally believed that business among both the wholesale and retail branches of the jewelry and optical trades for the first six months of the year will not equal in volume that of the first half of 1903. These trades, like all other lines, have felt the conservatism due to campaign and World's Fair year, but the falling off has been but slight. Crop prospects are good in the west. From the northern extreme of Chicago's territory down to the farthest south, there is scarcely a spot that is suffering in any degree. Collections are doing fairly well, considering the season."

Other papers confirm this hopeful opinion. The Lumber Review mentions the disturbing element of campaign year and further says: "The volume of business in the lumber trade this year has not been entirely satisfactory in any line of stock, but there are now indications that the tide is turning and that the business of the fall months will be equal to that during the fall months of last year. An average crop of all sorts is now assured and the financial market is easy."

The Iron Age says that for the iron and steel industries the past half year was big in the middle and little at both ends. In the beginning trade was depressed and the depression was widely felt. Then it picked up and prices advanced; then again, through May and June, orders were short and workmen idle. These latter occurrences, it says, are generally regarded as results of the past rather than symptoms of coming depression and adds:

"Favorable crop reports are largely given the credit for this display of cheerfulness, but the cause lies deeper than crop reports. Money is so abundant that interest rates are lower than they have been for a decade; security values are hardening instead of falling, and the investment demand for bonds and high grade stocks has for some time been steadily increasing. With the subsidence of the fear of financial disturbances, confidence in better business conditions is a natural sequence, especially when a good crop prospect offers itself as a substantial basis for expecting railroads to be favored with their usual traffic, not alone in moving crops, but in transporting other merchandise to supply the wants of prosperous agriculturists. Here rests the hope of the future."

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The Furniture Journal says that with the prospect of good crops and no financial disturbances trade will grow in volume as the end of the year is approached and that buyers, though not now placing their orders with great freedom, are making much memoranda for the fall buying; that prices have been reasonably well maintained and that each day has added to the confidence that there will be a fairly satisfactory business during the remainder of the year.

"The outlook for steel ranges for the coming year is about as good as it has been heretofore," says the Hardware Record, and adds: "Of course, trade conditions are not as favorable as they have been and the steel range business suffers its percentage. In spite of this, however, there appear to be new steel range manufacturers springing up every month."

"New York trade is dull," says The Presto, "but it is a natural annual condition beginning about July 1st and ending about September 1st," and also says that the piano trade suffers at that time because people who can afford to buy pianos spend those months at some of the nearby seashore or mountain resorts. Western piano trade has been quieter than last summer, but by no means dull. Active fall trade is expected and the piano player business flourishes. Good foundations for fall trade have been laid during the summer months.

The Railway Review declares that "the dullness everywhere prevailing in the steel industry is due to the general slowing down in all lines dependent on iron and steel production," and further says that "the present home outlook is for a period of comparative depression in the steel industry, which will continue until the great buying and consuming interests see their way clear to expand facilities and means of production."

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H. B. STURTEVANT Mining Engineer for the Buffalo and Susquehanna Iron Co., states:
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"Tucson, Ariz., July 3, 1904.—Deeds and title papers to the Lincoln Consolidated group of mines have been filed for record in Tucson, conveying the absolute title, free of incumbrance, to that corporation. There are 31 of these claims, about 700 acres. One group is more than a mile square and covers an entire mineralized mountain, where the ore in many places is rich enough to ship to the smelter from the very grass roots at a profit. The people of Tucson expect much from the operation of this property."

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WATERWAYS AID AUSTRIA'S COMMERCE.

In view of the increased interest being taken in interior waterways in the United States, it is well to point to the splendid success that Austria is experiencing in a similar ambition. In 1901 a law was passed providing $50,000,000 for the commencement of a network of navigable canals and river improvements in Austria. This amount was expected to cover the cost up to 1912, when a new credit will be required. So successful has been the beginning of the enterprise that now it is proposed to build a system of navigable canals extending over the Dual Monarchy and to bring Fiume, the only seaport in Hungary, into direct connection with the river system of the country, by aid of a canal between the Danube and the Sava.

Since the beginning of the improvements the river traffic in Austria has been steadily on the increase. On the Danube the average tonnage rose from 315,930 tons in 1890 to over 1,503,165 tons in 1900. In Hungary the traffic has increased from 2½ million tons in 1888 to 3¾ million tons in 1901.

The national system of railways has proceeded side by side with the increased facilities for navigation.

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THE TWO BEARS.

By H. B. W.

Of all the steps in life we take
  There's surely none involves
So many things to plan and make,
  So many good resolves,
As when we give our heart away,
  To one we hold most dear,
And promise on some future day,
  Without a doubt or fear,
To walk with him the path of life
  And be his true and loving wife.

Our friends they come with smiling look,
  And wish us every joy,
Or quote some passage from a book
  That tells of no alloy
To dim the brightness of the sun
  That shines on Love's sweet dream.
As we embark and sail along
  The matrimonial stream;

And maids and matrons all remark,
  And give advice most sage
About the way to steer our bark,
  From youth to good old age.
Some tell us how to build a house,
  Some what to put therein;
Some tell us what we need to buy,
  Of china, wood and tin.

All this was told me long ago,
  Some forty years and more,
By loving friends and wishers-well,
  In happy days of yore.
But one, the wisest of them all,
  In accents soft and low,
Said, "Listen, now, and I will tell
  Something you ought to know.

Some people like to keep a dog,
  A little one or big;
And some must have a tony horse
  To draw their handsome rig.
Chickens and turkeys, you should have,
  A cow, with geese and duck,
Is said to bring the money in
  And help along the luck.

All these are good, and do for pets,
  But home is not complete
Unless you have another pair,
  Whose praises I repeat.
Two little Bears should dwell with you—
  I've known their virtues long;
'Bear and Forbear,' if kept in view,
  Will make your life a song."

And so today, as gathered here
  In friendship's happy party,
This good advice I pass along
  With recommend most hearty;
And say to one we all hold dear,
  As on in life she fares,
May every joy your pathway crown,
  But don't forget the Bears.

Every Sunday a beauty contest is held and decided aboard the steamboat City of South Haven on its trip from Chicago to South Haven. The judges in each contest are the captain and two male passengers selected by the contestants themselves and the prizes are annual and trip passes over the company's lines. The contests occasion a great deal of fun and are heartily entered into.

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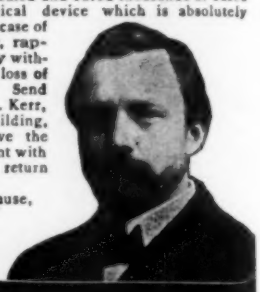

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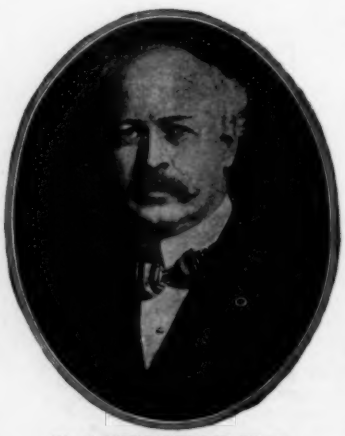

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